

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-260 742

AWARDS REGISTER: GRANTS ASSISTANCE PROGRAMS
VOLUME 1. LISTING AWARDS DURING JANUARY-JUNE
OF FY 1976, EXCEPT STATE AND LOCAL
ASSISTANCE AWARDS

ENVIRONMENTAL PROTECTION AGENCY,
WASHINGTON, D. C.

NOVEMBER 1976





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15. Supplementary Notes This is an addition to the series of Awards Registers.					
16. Abstracts This publication lists the grant awards offered by EPA during the period of January-June, Fiscal Year 1976, for research, demonstration, training and fellowship programs. A brief project description for each research and demonstration grant administered by Headquarters is contained in Section Two, arranged in ascending order of the Grant Identification Number. A Grant Number Index is included to assist cross-referencing into Section One material. Section Three provides a cross-walk for use in identifying the program and sub-program area of a grant. This conversion is based upon classification of programs by the Office of Research and Development and the assignment of Program Element Numbers by their staff.					
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Air		Radiation			
Solid Waste		Water Supply			
Hazardous Materials		Training			
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PREFACE

The Awards Register for January-June, 1976, consists of two volumes in which the data is organized first by State, then by grant program. Volume I provides information about the Agency's research, demonstration, training and fellowship awards in three separate sections:

Section One-geographic listing by State and program,

Section Two-Grant Number Index and brief project descriptions arranged in ascending order of the Grant Identification Number, and

Section Three-"cross-walk" to be used in determining the Office of Research and Development program and/or sub-program area in which an award was granted.

Volume II provides a geographic listing by State and grant program for State and local assistance program grants awarded during this six month period.

Project descriptions contained in Volume I were, for the most part, prepared by the grantees and are provided only for those grants administered by the EPA Headquarters office. Project descriptions for regionally administered research, demonstration, and training grant awards may be obtained from the appropriate EPA regional office (see Appendix). The inclusion of this information has proven to be very useful from a management aspect as well as in meeting and fulfilling requirements for providing information to the public. The Grant Number Index is provided as an aid for cross-referencing information between Sections One and Two. Locating a grant number in this index, the reader will find the name of the applicant and their State location. Then by referring to that State's listing(s) in Section One, the particular grant number will be found.

Section Three is a listing of the fourteen subprogram areas of EPA's Office of Research and Development and the program elements assigned to each. By referencing the data in Section One, the user can "cross-walk" to Section Three to identify the program area for each grant by using the program element assigned to it.

The format and preparation of this publication were performed by Julius Jay Sabo, Ellen O'Boyle and Corinne Allison. Computer programming assistance was provided by Donald L. Thie. The "cross-walk" between the Office of Research and Development program/subprogram classifications (14) and the program element numbers available from the Grants Information and Control System (GICS) was accomplished by Jay Sabo.

Any comments or criticisms should be directed to Ellen O'Boyle or Corinne Allison, Information Services Section on (202) 755-2830.

Grants Administration Division



**U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460**

GRANTS ADMINISTRATION DIVISION

GRANTS INFORMATION GUIDE

SOURCES OF INFORMATION ON EPA GRANTS AWARDED, REPORTS
GENERATED BY GRANTS AND OTHER GRANT RELATED MATERIALS

Awards Register, Grants Assistance Program
of EPA; January - June of Fiscal Year 1976

Volume I. Lists research, demonstration, training and fellowship awards by State, program, and grantee name in Section One. Each record provides applicant name, municipality, program element, title, project director name, Grant Identification Number, type of grant award, date and dollar amount of award. Section II contains brief project descriptions for research and demonstration projects administered by Headquarters and is arranged in ascending order of the Grant Identification Number. An index is provided for cross-referencing the information between Sections I and II. Section III is a cross-walk for use in identifying the program/subprogram area of a grant in accordance with classifications of our office of Research and Development. Environmental Protection Agency, EPA-GAD/1-76-003, NTIS number and price to be assigned.

Volume II. Lists all State and Local Assistance Awards by State, by program, by grantee name. Contents and format the same as for Volume I, Section One. Environmental Protection Agency, EPA-GAD/1-76-004, NTIS number and price to be assigned.

Awards Register, Grants Assistance Program
of EPA; 1st Half Fiscal Year 1976

Volume I. Lists all awards in research, demonstration, training and fellowships in Section I. Section II contains a 250 word description of most research and demonstration projects. Section III provides an index of all awards arranged by subject content according to the fourteen sub-program classifications of our Office of Research and Development. Environmental Protection Agency, EPA-GAD/1-76-001, NTIS number PB252893, price \$6.75.

Volume II. Lists all State and Local Assistance Awards. Environmental Protection Agency, EPA-GAD/1-76-002, NTIS order number PB253091, price \$9.25.

Issue Date: November 10, 1976
Information Services Section

Awards Register, Grants Assistance Programs of EPA;
During 2nd Half of Fiscal Year 1975.

Volume I. Lists all awards in research demonstration, training and fellowship in Section I. Section II contains a 250 word description of most research and demonstration project. Environmental Protection Agency, EPA-GAD/175-003. Price \$8.50 Paper, \$2.25 microfiche, NTIS order no. PB 245 575

Volume II Lists all State and Local Assistance Awards.

Environmental Protection Agency, EPA-GAD/1-75-004
Price \$9.25 Paper, \$2.25 microfiche, NTIS order
no. PB 245 576

Semi Annual Award Listing, Grants Assistance Programs of EPA;
Awards During 1st Half of Fiscal Year 1975

Volume I Lists all awards in research, demonstration, training and fellowship

Environmental Protection Agency, EPA-GAD/1-75-001
available from NTIS, publication no. PB 241 476
\$4.25 Paper, \$2.25 microfiche.

Volume II Lists all State and Local Assistance Awards

Environmental Protection Agency, EPA-GAD/1-75-002
available from NTIS, publication no. PB 241 400/
as \$7.00 Paper, \$2.25 microfiche.

Awards Register-Grants Assistance Programs-Showing Projects
Awarded in Fiscal Year 1974

Volume I Lists all awards in Fiscal Year 1974
Except Waste Water Treatment Construction
and Waste Water Treatment Reimbursement
Awards. Contains 168 pages

NTIS order no. PB 238 370/AS
\$6.25 Paper copy and \$2.25 microfiche

Volume II Lists only Waste Water Treatment Construction
Awards in Fiscal Year 1974

NTIS order no. PB 238 371/AS
\$7.25 Paper copy and \$2.25 microfiche

Volume III Lists only Wastewater Treatment Reimbursement
Awards in Fiscal Year 1974

NTIS order no. PB 238 372/AS
\$7.00 Paper copy and \$2.25 microfiche

Awards Register-Grants Assistance Program-Showing Projects
Awarded in Fiscal Year 1973, EPA 220/
1-73-004, NTIS order no. PB 229 827/AS
\$10.00 Paper copy, \$1.45 microfiche

The format of the above publications has the initial sort by States.
Each entry includes grantee identification, program area (such as
water, air) grant title, grant number, award date and dollar amount.

The public can purchase the above from the:

National Technical Information Service (NTIS)
Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22151
(703) 321-8507

THE AWARDS REGISTER, GRANTS ASSISTANCE PROGRAMS (EPA) SHOWING
PROJECTS AWARD IN FISCAL YEAR 1972

This publication can be purchased from the Superintendent of
Documents, U. S. Government Printing Office (GPO), Washington, D.C.
20402. This document can be ordered for \$3.70 by mail delivery and
\$3.25 if picked up at GPO. When ordering, specify Stock Number
5500-00084. For materials ordered from the Government Printing
Office, address request and make checks payable to: Superintendent
of Documents, U. S. Government Printing Office.

WASTEWATER TREATMENT CONSTRUCTION DATA BASE

Awards for the wastewater treatment facilities construction
grants under Public Law 92-500 made during a particular month are
listed in a monthly publication entitled "Wastewater Treatment
Construction Data Base - Public Law 92-500 Project Records." This
publication is prepared by the Grants Administration Division and
distributed and sold by the National Technical Information Services.

The March 1974, issue (PB 231300) provides a base listing of all
grants awarded under Public Law 92-500. Beginning with the April
1974, issue (PB 231300-01) the listings will contain awards for one
month only and will be numbered in sequence. Microfiche (24X) of
each copy is also available. The subscription price is \$100.00 for 12
issues. Previous issues can be purchased at \$25.00 a copy.

The publication is distributed to subscribers approximately six weeks after the close of the awards-listed month. It may be obtained through:

National Technical Information Services
U. S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22151

NOTE: All of the preceeding publications are available for examination at the Grants Office and Library of EPA Headquarters and each Regional Office.

NEW STATE PROJECT PRIORITY LIST PUBLISHED

State Project Priority Lists are expected to include projects planned for EPA funding thru the next September. Lists from some States may include a lesser number of projects, or in a few cases, a project priority list for a particular State may not have been available for inclusion in the publication. Information on the various aspects of the projects would be available only thru the respective State Water Pollution Control Agency or the EPA Regional Office, if the State has completed its processing of the application. A list of State Water Pollution Control Agencies is contained in the EPA publication "Federal Assistance Programs of the Environmental Protection Agency" listed below.

Addendums to the "Project Priority List" will be issued as these lists become available. To avoid delaying the publication of the material on hand, this Project Priority List will be issued through NTIS as part of the subscription service for the "Wastewater Treatment Construction Grants Data Base."

The "State Project Priority List" should be used in conjunction with the "WWT Data Base" since the making of an award on a project contained on this list is reflected in the monthly issue of the "WWT Data Base." Because of this and the necessity of issuing addendums to purchasers of the initial priority list, the list will not be sold separately.

"FEDERAL ASSISTANCE PROGRAMS OF THE ENVIRONMENTAL PROTECTION AGENCY"

This publication includes descriptive information about Environmental Protection Agency (EPA) assistance programs reprinted from the Catalog of Federal Domestic Assistance, which was prepared for the Office of Management and Budget. Similar information on programs of all Federal agencies is included in the Catalog which is available from the Superintendent of Documents, Government Printing Office, Washington D. C. 20420 for \$17.00 and includes charges as issued for the 1975 edition. It is also available for public use in Federal Depository Libraries.

The EPA Regional Offices and the Water Pollution Control Agency of each State are listed in the Appendixes. Applications for Wastewater Treatment Construction Grants should be obtained through the State Water Pollution Control Agencies. This booklet contains general information about the EPA grant programs useful to an applicant.

This booklet is revised periodically to reflect program changes and new legislation which affect EPA assistance programs.

Copies of this booklet may be obtained from the Environmental Protection Agency, Grants Information, Grants Administration Division (PM-216), Office of Planning and Management, Washington, D.C. 20460.

OTHER GRANT RELATED INFORMATION

A 200-250 word summary of a grant project is available on the majority of research and demonstration grants.

These summaries are available only for projects that have received EPA funding. In rare instances, a grant application may contain privileged information and is so designated. For these, only the award data, such as grant number, applicant's name, organization, location, grant title, grant amount awarded, and award date is available; other information may be available depending on the particular circumstances.

The Smithsonian Science Information Exchange (SSIE) Rm. 300 1730 M Street, N.W., Washington, D.C. 20036, receives a copy of the summary of a grant and makes it available to the public on a fee basis. The cost of a print-out, if the Agency is identified and the grant or contract number is provided, costs \$1 per grant number with a \$10 minimum fee. A Search on a subject (topic) is \$50 per search service for 1 to 50 titles, and in addition \$10 for up to 50 additional titles. A search on the investigators name can also be performed. All inquiries and request for this service should be addressed to SSIE or phone (202) 381-5511.

REPORTS GENERATED BY GRANT SUPPORTED PROJECTS

Final reports and other program reports generated by grant supported projects are published and made available if merited. Grants Administration Division does not have the responsibility for the technical monitoring of grants projects, this is the programs function; therefore, program and final report information is available from the following program offices:

For solid waste management and resource recovery:

Publication and Distribution Unit
Office of Solid Waste Management
EPA, Cincinnati, OH. 45268

For air pollution control:

Air Research Technical Information Center
Environmental Protection Agency
Research Triangle Park, North Carolina 27711

For pesticide publications:

Information Section
Office of Pesticide Programs
EPA, Washington, D.C. 20460

For water:

Publications Branch (water) Research
Information Division
EPA, Washington, D.C. 20460

For other research and demonstration projects:

Technical Information Staff
Office of Research & Development
EPA, Cincinnati, Ohio 45268

Each of the above units publishes a bibliographic list showing price and giving purchasing information.

EPA REPORTS BIBLIOGRAPHY QUARTERLY

~~The~~ Quarterly bibliography series supplement the original one (EPA-LIB-73-01, PB-223 693) dated July 1973 and the first supplement (EPA-LIB-74-03, PB-234 215) dated August 1974, and the second supplement (PB-238 800) dated December 1974. It contains citations, abstracts and author, corporate source, subject, contract, and title indexes for all US Environmental Protection Agency and its predecessor agencies' reports entered into the NTIS collection in the period noted.

The original bibliography, and the ~~first and second~~ supplements should provide sufficient information for any user to identify any EPA report desired. Copies of the individual reports will be available from NTIS in either hard copy or on microfiche. NTIS will also provide the EPA reports in microfiche as a set; cost figures may be obtained from NTIS. EPA libraries contain complete sets of microfiche on all items included in these bibliographies. In addition, a complete set has been made available to 25 foreign countries which now have, or are contemplating, the establishment of an environmental agency.

SUBSCRIPTION SERVICE

Starting in January 1975, all items entered into the NTIS information collection have been collected quarterly and published in a continuing series. You may start your subscription to this series by sending your order with payment to:

Subscriptions
National Technical Information Service
Springfield, VA 22161

An annual subscription to "EPA Reports Bibliography Quarterly" costs \$45 (U.S.), \$60 for addresses outside of the U.S. Individual copies can be ordered when available at a cost of \$15 each (U.S.), \$20 for addresses outside the U.S.

A few EPA reports announced by NTIS prior to December 1974 were omitted from the original EPA Reports Bibliography, EPA-LIB-73-01 and subsequent supplements. Those reports are included in this Quarterly.

Library Systems Branch
Management and Organization Division
Office of Administration
Office of Planning and Management

The following EPA libraries maintain complete sets of EPA reports, on microfiche, covered by the original bibliography and supplements.

Region I Library
Room 2211-B, JFK Federal Bldg.
Boston, Massachusetts 02203

National Marine Water Quality Lab
P.O. Box 277
West Kingston, Rhode Island 02892

Region II Library
26 Federal Plaza
New York, New York 10007

Region II Field Office Library
Edison, New Jersey 08817

Region III Library
Curtis Bldg., 6th & Walnut Streets
Philadelphia, Pennsylvania 19106

Headquarters Library, Room 2404 WSM
401 M Street, S.W.
Washington, D.C. 20460

Region IV Library
345 Courtland Street, N.E.
Atlanta, Georgia 30308

Reference Library
Office of Administration
Research Triangle Park,
North Carolina 27711

Southeast Environmental Research
Lab
College Station Road
Athens, Georgia 30601

Gulf Breeze Laboratory
Sabine Island, Bldg. 29
Gulf Breeze, Florida 32561

Region V Library
230 South Dearborn Street
Chicago, Illinois 60604

Central Technical Library
National Environmental Research Center
Cincinnati, Ohio 45268

National Water Quality Laboratory
6201 Congdon Boulevard
Duluth, Minnesota 55804

Region VI Library
First International Building
1201 Elm Street
Dallas, Texas 75270

Robert S. Kerr Environmental Research
Laboratory
P.O. Box 1198
Ada, Oklahoma 74820

Region VII Library
1735 Baltimore Avenue, Room 249
Kansas City, Missouri 64108

Region VIII Library
1860 Lincoln Street, Suite 900
Denver, Colorado 80203

National Field Investigation Center
Room A-1209, Bldg. 53
Box 25227, Denver Federal Center
Denver, Colorado 80225

Region IX Library
100 California Street
San Francisco, California 94111

National Environmental Research Center
P.O. Box 15027
Las Vegas, Nevada 89114

Region X Library
1200 Sixth Avenue
Seattle, Washington 98101

National Environmental Research Center
200 S.W. 35th Street
Corvallis, Oregon 97330

SECTION I

APPLICANT	MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
•• RESEARCH ••							
AUBURN UNIV.	AUBURN	EME624 DEWATERING PRINCIPLES AND EQUIPMENT DESIGN STUDIES	WARMAN, J. C.	90453101	NEW	76/05/07	\$75,000
•• TRAINING ••							
JEFFERSON COUNTY BOARD OF EDUCATION	BIRMINGHAM	28F159 STATE & LOCAL MANPOWER DEVEL GRANT TO TRAIN WMTF OPERATORS	J R MCGUIRE-	00418901	NEW	76/04/30	\$17,380
•• FELLOWSHIPS ••							
ALABAMA, UNIV. OF	BIRMINGHAM	2AK139 R.S. FENGR.	CAIN, V. M.	91090101	NEW	76/06/03	\$378

ALABAMA

AMOUNT OF
GRANT AWARD

DATE OF
AWARD

TYPE OF
GRANT

GRANT NO

PROJECT DIRECTOR /
FELLOW

PROGRAM
ELEMENT
TITLE

APPLICANT

MUNICIPALITY

A L A S K A

** TRAINING **

AK DEPT. OF ENVRN. CONSERVATION
JUNIFAU

2HK372
WASTEWATER OPERATOR TRAINING

JERRY REINWAND, DEPUTY

00011401

NEW

76/05/28

\$20,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
A R I Z O N A						
** RESEARCH **						
ARIZONA, UNIV. OF TUCSON	EMF424 EFFECT OF FUEL SULFUR ON NITROGEN OXIDE FORMATION IN COMBUSTION PROCESSES	WENDT, J. O.	90371502	CONT	75/06/16	\$65,000
ARIZONA, UNIV. OF TUCSON	10C513 UTILIZATION LIME, IRON OXIDES/FLUX CONTROL DESIGN DISPOSAL SITE LINERS MINIMIZE POLLUTION MIGRATION	FULLER, WALLACE H.	90399901	INC?	75/05/10	\$72,734
ARIZONA, UNIV. OF TUCSON	15A615 MODE OF ACTION OF CYCLOTRIN INSECTICIDES	CROWDER, LARRY A.	90435101	NEW	75/01/02	\$27,917
ARIZONA, UNIV. OF TUCSON	199510 REMOVAL OF IRON FROM ACIDIC WASTE PROCESS LIQUORS	RANDOLPH, A. D.	90455501	NEW	75/05/07	\$49,902
** TRAINING **						
ARIZONA, UNIV. OF TUCSON	28K159 TRAINING IN WATER POLLUTION CONTROL	SIERKA, RAYMOND A.	90019605	INC?	76/06/14	\$19,500
** FELLOWSHIPS **						
ARIZONA STATE UNIV. TEMPE	2AK139 M.S./ENVIRON. POLLUTION	HICKS, T. M.	91085901	NEW	76/06/01	\$7,514

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
A R K A N S A S						
** RESEARCH ** ARKANSAS, UNIV. OF FAYETTEVILLE	LAD605 DEVELOPMENT OF REAL TIME AEROSOL SIZE SPECTRUM ANALYZER	TESTERMAN, M.K.	80442901	NEW	76/06/28	\$38,739
** TRAINING ** ARK DEPT POLLUTION CONTROL & ECOLOGY LITTLE ROCK	2BP158 ARK STATE PROGRAM OF TRAINING FOR HWY FACILITY OPERATORS	S LADD DAVIES	00611202	CONT	75/03/11	\$10,831

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C A L I F O R N I A						
** RESEARCH **						
AEROSPAC CORP. LOS ANGELES	1AA603 THE ROLE OF GAS-SOLID INTERACTIONS IN AIR POLLUTION	JUDEKIS, M. S.	90258702	INCR	76/03/17	\$25,000
AEROSPAC CORP. LOS ANGELES	EME524 ANALYSIS OF NOX CONTROL IN STATIONARY SOURCES	DYKEMA, G. W.	90329303	CONT	75/05/19	\$112,399
CALIFORNIA, UNIV. OF OIVERSIDE	1AD605 MEASURE HALOGENATED POLLUTANTS & OTHER TRACE GASES TROPOSPHERE BY INFRARED ABSORPTION SPECTROSCOPY	PITTS, J.	90454601	NEW	76/05/03	\$69,485
CALIFORNIA INST. OF TECH. PASADENA	1AD605 RELATIONSHIP OF THE SMOG AEROSOL TO POLLUTION SOURCES	FRIDLANDER, S. K.	90214004	CONT	75/03/12	\$50,000
CALIFORNIA, UNIV. OF DAVIS	1HM617 IRRIGATION TAILWATER MANAGEMENT	TANJIL, K. K.	90350302	CONT	76/02/26	\$100,031
CALIFORNIA, UNIV. OF BERKELEY	EME624 POWER PLANT COOLING TOWER BLOWDOWN RECYCLE BY VERTICAL TUBE EVAPORATION WITH INTERFACE ENHANCEMENT	FERTON, HUGO H.	90357901	NEW	75/03/17	\$331,344
CALIFORNIA, UNIV. OF LOS ANGELES	ICC614 HUMAN BODY RESPONSES OF ARSENIC & SELENIUM AS RESULT OF WATER CONTAMINATION	VALENTINE, JANE L.	90379801	INCR	76/05/27	\$6,711
CALIFORNIA, UNIV. OF BERKELEY	1EAS13 TOXAPHENE COMPOSITION AND TOXICOLOGY	CASIDA, J. E.	90391302	CONT	76/06/01	\$45,300
CALIFORNIA, UNIV. OF OIVERSIDE	1EA615 CHEMISTRY & MODE OF ACTION OF INSECTICIDES	FUKUTO, T. ROY	90434501	NEW	76/01/06	\$105,084
CALIFORNIA, UNIV. OF BERKELEY	ICC614 ASBESTOS IN DOMESTIC WATER SUPPLIES & CANCER INCIDENCE IN 5 CALIFORNIA COUNTIES	CORBER, ROBERT C.	90436601	NEW	76/01/25	\$84,321

APPLICANT	MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
•• RESEARCH ••							
HYDROMOP, INC. PALO ALTO			GRAFFIGNO, NORMAN M. FINAL TESTING & COMPLETION OF WATERSHED-SCALE PESTICIDE & NUTRIENT TRANSPORT MODEL	90372201	INCR	75/06/15	\$77,452
MONTGOMERY CHEMICAL CORP. EMERYVILLE			SPRELMAN, MAX DEMONSTRATION OF A DOT MANUFACTURING & PROCESSING PLANT WASTE TREATMENT SYSTEM	90423101	NEW	76/01/07	\$69,305
SANTA CLARA, UNIV. OF SANTA CLARA			DEPLEY, RICHARD K. CHARACTERIZATION & RESEARCH INVESTIGATION OF METHANOL & METHYL FUELS IN AUTOMOBILE ENGINES	90354802	CONT	75/04/15	\$93,554
SCRIPPS CLINIC & RES. FDN. LA JOLLA			CANJLIKER, WALTER B. EFFECTS OF PESTICIDES ON THE IMMUNE RESPONSE	90339501	NEW	76/01/25	\$63,757
STANFORD RES. INST. MENLO PARK			GOLDEN, DAVID M. MEASUREMENT OF RATE CONSTANTS OF IMPORTANCE IN SMOG	90228903	INCR	76/03/08	\$37,975
STANFORD RES. INST. MENLO PARK			HENDRY, DALE G. REACTIONS OF OXY RADICALS IN THE ATMOSPHERE	80394602	CONT	76/05/17	\$65,000
STANFORD RESEARCH INST. MENLO PARK			JONES, J. L. IDENTIFICATION OF RES. DEVELOPMENT & DEMO. NEEDS FOR POLLUTION CONTROL IN FOOD INDUSTRY	80454201	NEW	76/06/25	\$80,710
STANFORD UNIV. STANFORD			MCCARTY, PERRY L. GROUNDWATER INJECTION OF RECLAIMED WATER IN PALO ALTO	90463101	NEW	76/04/05	\$279,000
TETRA TECH. INC. LAFAYETTE			CHEN, C. M. MODELING FOR 208 AREA WIDE WASTE MGMT. PLANNING IN NON DESIGNATED AREAS	90465001	NEW	76/04/16	\$112,213

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C A L I F O R N I A						
•• DEMONSTRATION ••						
GOVERNMENTAL EFFUSE COLLECTION & DISP. ENGINE	20M297 IRIS PROGRAM IMPLEMENTATION	WARNER, E.	90454401	NEW	76/04/14	\$20,160
ORANGE CNTY. WATER DIST. FOUNTAIN VALLEY	19C611 EVALUATION OF FULL SCALE WASTEWATER REUSE SYSTEM FOR DOMESTIC GROUNDWATER REPLEISHMENT	ARGO, DAVID G.	90397301	INCR	76/03/27	\$50,000
SAN DIEGO CNTY. SAN DIEGO	20M297 SAN DIEGO CNTY. SOLID WASTE RESOURCE RECOVERY PROJECT	HOUSON, C. J.	90159901	INCR	76/03/29	\$700,000
SAN FRANCISCO, CITY OF SAN FRANCISCO	19C611 DEMONSTRATE REAL TIME AUTOMATIC CONTROL IN COMBINED SEWER SYSTEMS	FRIEDLAND, A. C.	90374302	CONT	76/04/30	\$50,000
SAN JOSE, CITY OF SAN JOSE	19C611 DEMONSTRATION OF NON-POINT POLLUTION ABATEMENT THROUGH IMPROVED STREET CLEANING PRACTICES	BLACKBURN, RICHARD	90433201	NEW	76/05/24	\$163,000
STANISLAUS CNTY. MONESTO	20M297 RESOURCE RECOVERY IMPLEMENTATION GRANT	WINKIN, J. D.	90490001	NEW	76/06/22	\$18,700
•• TRAINING ••						
CALIF ST RD OF FIRE SVCS SACRAMENTO	20K572 TRAINING PROGRAM FOR EMERGENCY HANDLING OF SPILLS AND FIRES	EDWARD SEITS	00910701	NEW	76/05/25	\$10,000
CALIFORNIA STATE UNIV. OF SACRAMENTO	28K159 CORRESPONDENCE SCHOOL & CLASSROOM TRAINING PROGRAM FOR MAINTENANCE PERSONNEL	KEREL, KENNETH D.	90049402	INCR	76/01/26	\$30,015
CALIFORNIA, UNIV. OF DAVIS	28K159 ENVIRONMENTAL ENGINEERING INCLUDING IRRIGATION SCIENCE & CHEMICAL ENGINEERING	KRONE, RAY P.	90013106	INCR	75/05/10	\$22,200
CALIFORNIA, UNIV. OF BERKELEY	28K159 PROFESSIONAL TRAINING IN WATER POLLUTION CONTROL SCIENCE & ENGL.	SELLECK, ROBERT F.	90019005	INCR	76/06/30	\$16,692

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C A L I F O R N I A						
** TRAINING ** SOUTHERN CALIFORNIA, UNIV OF LOS ANGELES	2AK139 DISSEMINATION OF APEX II	MCCINTY, RICHARD	90055901	INCR	76/05/21	\$15,500
STANFORD UNIV. STANFORD	2AK159 ENVIRONMENTAL AND WATER QUALITY MANAGEMENT	MCCARTY, PERRY L.	90013308	INCR	76/03/08	\$22,250
			90013308	INCR	76/06/10	\$27,000
VENTURA REG CNTY SAN O VENTURA	2AK372 SOLID WASTE MGMT TRAINING FOR SAMOA	PHILLIP A REAUTROW	00911901	NEW	76/05/25	\$7,900
** FELLOWSHIPS ** ANTIOCH COLLEGE SAN FRANCISCO	2AK139 PUBLIC ADMIN.	STAENLI, P. L.	91081701	NEW	76/06/10	\$3,460
CALIFORNIA STATE COLLEGE DOMINGUEZ HILLS	2AK139 M.S./ENVIRON. STUDIES	FOTIADES, M. B.	91078201	NEW	76/06/10	\$1,415
CALIFORNIA STATE COLLEGE DOMINGUEZ HILLS	2AK139 M.S./ENVIRON. STUDIES	SAPP, M. J.	91033001	NEW	76/05/23	\$1,415
CALIFORNIA STATE COLLEGE DOMINGUEZ HILLS	2AK139 M.S./ENVIRON. STUDIES	FISHER, F. L.	91033101	NEW	76/06/09	\$1,415
CALIFORNIA STATE COLLEGE DOMINGUEZ HILL	2AK139 M.S.	BROWN, J. L.	91033201	NEW	76/05/08	\$1,415
CALIFORNIA STATE UNIV. SACRAMENTO	2BK159 B.S.	WEISS, C. A.	91077901	NEW	76/05/11	\$2,440

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT N°	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C A L I F O R N I A						
** FELLOWSHIPS **						
CALIFORNIA STATE UNIV. LOS ANGELES	2BK139 M.S./ELECTRICAL ENGR.	PADKE, N. M.	91077801	INCR	75/06/11	\$190
CALIFORNIA STATE UNIV. FULLERTON	2BK139 M.S.	NOVACK, M. M.	91092601	NEW	76/06/08	\$1,064
CALIFORNIA, UNIV. OF DAVIS	2BK159 M.S./HORTICULTURE	GILPIN, D. M.	91077501	NEW	75/04/15	\$3,571
CALIFORNIA, UNIV. OF DAVIS	2BK159 M.S./ECLOGY	CONCORAN, D. P.	91077701	NEW	76/06/14	\$6,500
CALIFORNIA, UNIV. OF IRVINE	2BK159 PH.D./ENGR.	MUNGER, R. B.	91079101	NEW	76/06/03	\$1,128
CALIFORNIA, UNIV. OF BERKELEY	2BK139 M.S.	PHILLIPS, J.	91095001	NEW	76/06/22	\$1,142
CALIFORNIA, UNIV. OF SANTA BARBARA	2BK139 M.S./ENGR.	WHITE, P. C.	91092101	NEW	76/06/07	\$5,930
HEALD ENGINEERING COLLEGE SAN FRANCISCO	2BK139 B.S./ELECTRONIC ENGR.	THOMSON, C. P.	91098401	NEW	76/06/11	\$2,257
SAN DIEGO STATE UNIV. SAN DIEGO	2BK159 M.S./PUBLIC ADMINISTRATION	MCLEROY, CHARLES M.	91070801	NEW	76/01/12	\$3,380

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C A L I F O R N I A						
** FELLOWSHIPS **						
SAN JOSE STATE UNIV. SAN JOSE	2AK139 B.S./CHEMICAL ENGR.	WONG, N. M.	91088201	NEW	76/06/25	\$644
SANTA CLARA, UNIV. OF SANTA CLARA	2AK139 M.S./MECHANICAL ENGR.	MANAGAT, T. S.	91077901	NEW	76/06/22	\$1,314
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	2AK139 M.S./ENVRN. ENGR.	REDEMER, MICHAEL D.	91059401	INCR	76/01/22	\$381
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	2AK139 M.S./PUBLIC ADMIN.	VICKERY, JAMES S.	91078101	NEW	76/06/03	\$1,429
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	2BK159 THREE MONTH COURSE IN THERMAL POLLUTION	HOLLOMAN, J. G.	91082401	NEW	75/04/12	\$2,100
STANFORD UNIV. STANFORD	2AK139 M.S.	KOPPEL, R. L.	91097701	NEW	76/06/16	\$4,875

APPLICANT	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MUNICIPALITY						
C O L O R A D O						
** RESEARCH **						
AMERICAN WATER WORKS ASSOC. RES. FDN. DENVER	ICC614 REMOVAL OF TRACE ORGANICS FROM WATER USING ACTIVATED CARBON & POLYMERIC ADSORBENTS	TARAS, MICHAEL J.	80443301	NEW	76/05/24	\$98,125
COLD DEPT OF HEALTH, AIR POLLUTION DENVER	EHE625 COLORADO ENERGY DEVELOPMENT AREA RESEARCH PROGRAM	EDWARD G. DREYFUS MD.	00913101	NEW	75/03/30	\$30,964
COLORADO SCHOOL OF MINES GOLDEN	EHE623 ENVIRONMENTAL & POLLUTION ASPECTS OF COAL SLURRY PIPELINES	FADDICK, R. R.	80451601	NEW	76/06/10	\$44,924
COLORADO SCHOOL OF MINES RES. INST. GOLDEN	EHE625 MINERALOGY OF OVERBURDEN RELATED TO GROUNDWATER DEGRADATION IN STRIP MINING OF COAL	KLOPPER, D. L.	80416201	INCR	75/05/30	\$319,084
COLORADO STATE UNIV. FORT COLLINS	EHE625 STUDIES OF EFFECTS OF ATMOSPHERIC EFFLUENTS FROM COAL-FIRED POWER PLANTS ON TERRESTRIAL ECOSYSTEM	DOOD, JERROLD L.	80317503	CONT	76/06/11	\$154,219
COLORADO STATE UNIV. FORT COLLINS	1H8617 CHARACTERISTICS OF ANIMAL WASTES & RUNOFF AS AFFECTED BY MANURE HARVESTING PRACTICES	HANSEN, RALPH	80337801	INCR	75/05/10	\$3,927
COLORADO STATE UNIV. FORT COLLINS	1H8617 SOCIO-ECONOMIC AND INSTITUTIONAL FACTORS IN IRRIGATION RETURN FLOW QUALITY CONTROL	VLACHOS, EVAN	90357202	CONT	76/01/09	\$105,652
COLORADO STATE UNIV. FORT COLLINS	1AA603 RESIDENCE TIME OF ATMOSPHERIC POLLUTANTS & LONG-RANGE TRANSPORT	REITER, FLAP R.	90358501	INCR	75/04/25	\$40,000
COLORADO, UNIV. OF BOULDER	ICC614 DETERMINE HEALTH EFFECT DATA & CRITERIA DOCUMENT RECOMMENDING DRINKING WATER STANDARD FOR MOLYBDENUM	CHAPPELL, W. R.	90354502	CONT	76/03/29	\$122,661
			90354502	INCR	75/05/16	\$500

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C O L O R A D O						
** PESEAPCH **						
COLORADO, UNIV. OF BOULDER	188510 EFFECT OF ZONATION ON ORGANICS IN WASTEWATER	CHAPPELL, W. R.	90447201	NEW	75/04/12	\$88,774
DENVER, UNIV. OF DENVER	1AD605 SYMPOSIUM ON THE DENVER (1973) AIR POLLUTION FIELD STUDY	RUDD, C. O.	90359001	INCR	76/01/15	\$3,250
IRRIGATION HYDROLOGY CO. FT. COLLINS	1HB617 IDENTIFICATION AND INITIAL EVALUATION OF IRRIGATION RETURN FLOW MODELS	WALKER, W. R.	90451501	NEW	75/05/03	\$14,100
** DEMONSTRATION **						
COLORADO STATE UNIV. FORT COLLINS	1HB517 RECYCLE & UTILIZATION OF LIVESTOCK MANURE THRU SUBSURFACE INJECTION	SMITH, JAMES L.	90294001	INCR	76/04/12	\$5,080
COLORADO STATE UNIV. FORT COLLINS	1HB617 IMPLEMENTATION OF AGRICULTURAL SALINITY CONTROL TECHNOLOGY IN GRAND VALLEY	SKOGERBOM, GAYLORD V.	90298503	CONF	76/01/12	\$69,313
** TRAINING **						
COLORADO DEPT OF HEALTH DENVER	2HK572 INSTRUCTOR DEVELOPMENT WORKSHOP	FRANK J. ROZICH, DIREC	00915101	NEW	75/05/21	\$3,000
COLORADO DEPT. OF HEALTH DENVER	STATE WATER QUALITY CONTROL OPERATOR TRAINING PROGRAM	FRANK J. ROZICH, DIREC	00915501	NEW	76/06/22	\$8,518
COLORADO STATE UNIV. FORT COLLINS	2BK159 WATER QUALITY MICROBIOLOGY & ENGINEERING	MORRISON, S. M.	90026605	INCR	75/05/07	\$15,200
COLORADO STATE UNIV. FORT COLLINS	2AK139 TRAINING PROGRAM ON MOTOR VEHICLE EMISSIONS CONTROL FOR AUTOMOTIVE TEACHER	HAYES, D. B.	90054901	INCR	76/06/09	\$14,740

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NT	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C O L O R A D O						
** TRAINING **						
COLORADO STATE UNIVERSITY FORT COLLINS	2HK572 DEVELOPMENT OF SELF-INSTRUCTION PROG LEARNING MATERIAL FOR MOTOR VEHICLE EMISSION CONTROL SYSTEMS	GALEN FRANTZ, CONTRACT	00913501	NEW	76/03/30	\$24,883
DENVER COMMUN. COLLEGE DENVER	2BK158 NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM TRAINING	FEELY, THOMAS	90057901	NEW	76/05/11	\$25,305
** FELLOWSHIPS **						
COLORADO STATE UNIV. FT. COLLINS	2AK139 M.S.	GLENN, K. D.	91092801	NEW	76/05/01	\$8,890
COLORADO STATE UNIV. FORT COLLINS	2BK159 M.S./CIVIL ENGR.	MILULA, M. J.	91093901	NEW	76/06/09	\$4,905

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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C O N N E C T I C U T

** TRAINING **

CONNECTICUT PUBLIC TELEVISION
HARTFORD

2CH225 ALLISON, J. B.
PUBLIC TELEVISION PROGRAM- PHOTOGRAPHY OF
A DRINK OF WATER

90058001 NEW 75/05/27 \$74,352

** FELLOWSHIPS **

CONNECTICUT, UNIV. OF
STORRS

2BK139 POLLINS, D. F.
M.S./ENVIRONMENTAL ENGINEERING

91083301 NFA 76/04/28 \$3,378

NEW HAVEN, UNIV. OF
WEST HAVEN

2AK139 BOULITTLE, W. J.
M.S.

91093901 NEW 75/05/25 \$1,289

NEW HAVEN, UNIV. OF
WEST HAVEN

2AK139 SIMONE, L. C.
M.S./ENVRN. ENGR.

91095401 NEW 76/05/26 \$1,289

APPLICANT MUNICIPALITY

PROGRAM ELEMENT TITLE

PROJECT DIRECTOR / FELLOW

GRANT NO

TYPE OF GRANT

DATE OF AWARD

AMOUNT OF GRANT AWARD

DISTRICT OF COLUMBIA

RESEARCH

AMERICAN DEFENSE PREPAREDNESS ASSOC.
WASHINGTON

1AB604
STATE OF THE ART OF DEMILITARIZATION OF
EXPLOSIVES AND PROPELLANTS
SULLIVAN, AUTHUR D.
NEW 76/03/02 \$30,000

ASSOCIATION OF METRO SEWERAGE AGENCIES
WASHINGTON

1BC611
FIELD REPORT ON CURRENT PRACTICES AND PROBLEMS
OF SLUDGE MANAGEMENT
ELLICOTT, A. S.
NEW 76/04/30 \$24,400

ASSOCIATION OFFICIAL ANALYTICAL CHEMIS
WASHINGTON

2F0178
EPA MANUAL OF CHEMICAL METHODS FOR PESTICIDES
& DEVICES
BERDZA, MORTON
NEW 76/03/10 \$14,000

ENVIRONMENTAL LAW INSTITUTE
WASHINGTON

1DC618
AN ANALYSIS OF SCRAP FUTURES MARKETS FOR
STIMULATING RESOURCE RECOVERY
ANDERSON, ROBERT C.
NEW 76/05/21 \$27,950

HOWARD UNIV.
WASHINGTON

1BC611
EFFICIENCY OF OFF-STREAM DETENTION-RETENTION
MEASURES AS SEDIMENT CONTROL DEVICES
YEN, CHIN-LIU
INCR 76/04/26 \$11,000

HOWARD UNIV.
WASHINGTON

1HD622
GENETIC AND CELLULAR EFFECT OF MICROWAVE
RADIATION
DUTTA, S. K.
CONT 76/04/28 \$43,175

NATIONAL COUN. ON RES. IN ENERGY CONS.
WASHINGTON

FHE624
ANNUAL REPORT NATIONAL ADVISORY COUNCIL
ON RESEARCH IN ENERGY CONSERVATION
WILLIAMS, CHARLES W.
NEW 76/03/26 \$2,000

PUBLIC TECHNOLOGY, INC.
WASHINGTON

1CC614
STATUS OF OXINATION & CHLORINE DIOXIDE
TECHNOLOGIES FOR TREATMENT OF MUNICIPAL WATER SUPPLIES
MILLER, G. WADE
NEW 76/05/25 \$99,573

SMITHSONIAN INST.
WASHINGTON

1MB617
LOW POINT POLLUTION STUDIES ON AGRICULTURAL
LAND USE TYPES PREVALENT IN COASTAL PLAIN ZONE OF MD.
CORRELL, D. L.
NEW 76/06/11 \$334,846

DEMONSTRATION

AMERICAN PROZEN FOOD INST.
WASHINGTON

1B9610
INTEGRATED FOOD VIOLATION BLANCH-COOLER
FOR REDUCING POLLUTION CAUSED BY BLANCHING OF VEGETABLES
CARQUHAR, JOHN W.
INCR 76/05/10 \$33,400

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
DISTRICT OF C O L U M B I A						
** DEMONSTRATION **						
INSTITUTE OF INDUSTRIAL LAUNDERERS WASHINGTON	188610 DEMONSTRATION OF ULTRAFILTRATION/CARBON ADSORPTION FOR TREATMENT OF INDUSTRIAL LAUNDERING WASTEWATER	HUMPHREY, CHARLES E.	90436701	NEW	76/02/19	\$90,000
INTERNATIONAL CITY MANAGEMENT ASSOC. WASHINGTON	20M297 SOLID WASTE TECHNICAL ASSISTANCE FOR LOCAL GOVERNMENT MANAGERS	BARTOLOTTA, ROBERT J.	80436001	INCR	75/04/25	\$99,237
NATIONAL ASSOC. OF COUNTIES WASHINGTON	20M297 COUNTY SOLID WASTE RESEARCH PROJECT	O'BANNON, MICHAEL J.	80439901	NEW	76/01/20	\$65,000
NATIONAL CANNERS ASSOC. WASHINGTON	188610 TOMATO CLEANING & WATER RECYCLE	ROSE, WALTER W.	90325101	INCR	76/06/14	\$41,910
PUBLIC INTEREST ECONOMICS CENTER WASHINGTON	20M297 CHARGING SOLID WASTE COSTS AT THE POINT OF PRODUCTION	FERGUSON, ALLEN R.	80481901	NEW	76/06/16	\$28,566
PUBLIC TECHNOLOGY, INC. WASHINGTON	188610 FIELD TEST AND EVALUATION OF EPA-DEVELOPED HAZARDOUS SPILLS CONTROL HARDWARE	SMITH, JOHN T.	80440001	NEW	75/03/24	\$50,300
** TRAINING **						
ENVIRONMENTAL ACTION FDN. WASHINGTON	20M297 CITIZEN SOLID WASTE COMMUNICATIONS NETWORK	MUNSON, R.	90060301	NEW	76/06/30	\$50,000
GEORGETOWN UNIV. WASHINGTON	28P159 DEVELOPMENT OF MANPOWER TRAINING MATERIALS FOR EPA WATER POLLUTION CONTROL PROGRAMS	MUSHKIN, SELMA J.	90060901	NEW	76/06/22	\$28,378
LEAGUE OF CITIES-CONFERENCE OF MAYORS WASHINGTON	20M297 SOLID WASTE MANAGEMENT PROJECT	WILLIAMS, L. A.	90050701	NEW	76/06/03	\$70,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
DISTRICT OF C O L U M B I A						
** TRAINING **						
LEAGUE OF WOMEN VOTERS EDUCATION FUND WASHINGTON	2CH226 SAFE DRINKING WATER PILOT PROJECT	JOLLY, CAROL	90058301	NEW	75/05/27	\$175,275
LEAGUE OF WOMEN VOTERS EDUCATION FUND WASHINGTON	2BK159 208 AREA PLANNING PROCESS PROJECT	HILLS, MARTHA	90059501	NEW	76/06/03	\$174,997
LEAGUE OF WOMEN VOTERS EDUCATION FUND WASHINGTON	2DH297 CITIZEN EDUCATION AND ACTIVITY IN SOLID WASTE MANAGEMENT	ALLISON, G.	90060401	NEW	76/06/09	\$55,333
NATIONAL ASSOC. OF CONSERVATION DIST. WASHINGTON	2BK159 EDUCATION AND TECHNICAL TRANSFER FOR NON POINT POLLUTION CONTROL PROGRAMS	UNGER, D. G.	90057401	NEW	76/04/12	\$139,293
OIL CHEMICAL & ATOMIC WORKERS UNION WASHINGTON	2DH297 70AM HAZARDOUS WASTE EDUCATIONAL PROGRAM	MAZZOCCHI, A.	90061301	NEW	75/05/30	\$5,300
** FELLOWSHIPS **						
GEORGE WASHINGTON UNIV. WASHINGTON	2BK159 M.S./ADMIN.	BENIL, C. N.	91059001	INCR	76/05/03	\$1,843
GEORGE WASHINGTON UNIV. WASHINGTON	2BK139 M.S./ENVIRON. ENGR.	MEDELSON, E. S.	91087301	NEW	76/05/26	\$1,798
GEORGE WASHINGTON UNIV. WASHINGTON	2BK159 M.S.	BRAGAN, R. J.	91087501	NEW	76/04/30	\$2,745
GEORGE WASHINGTON UNIV. WASHINGTON	2BK139 M.S.	PARMEYER, D. D.	91090501	NEW	76/05/26	\$2,922

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
F L O R I D A						
** RESEARCH **						
DADF CNTY. DEPT. OF PUBLIC HEALTH MIAMI	ICC614 REMOVING ORGANIC CONTAMINANTS GROUND WATER PREVENT FORMATION POTENTIAL CARCINOGENS DRINKING WATER	MORGAN, R. A.	90452101	NEW	76/06/11	\$147,551
FLORIDA STATE OFFICE OF HEALTH TAMPA	1RA507 MONITORING FOR PATHOGENIC NAEGLERIA	WELLINGS, FLORA MAE	90437501	NEW	75/02/23	\$38,987
FLORIDA STATE UNIV. TALLAHASSEE	1AD605 ELEMENTAL QUANTITATIVE ANALYSIS OF AIR PARTICULATE MATTER BY PHOTON SCATTERING	NELSON, J. W.	90291303	CONT	76/04/29	\$19,000
FLORIDA STATE UNIV. TALLAHASSEE	1BA508 ANALYSIS STATISTICAL METHODS DETERMINE EFFECTS POLLUTANTS AQUATIC POPULATIONS & SPECIES ASSEMBLAGES	LIVINGSTON, R.	90333903	CONT	75/03/25	\$45,000
FLORIDA STATE UNIV. TALLAHASSEE	1AD605 ACCELERATOR BASED METHODS OF AEROSOL ANALYSIS FOR BERYLLIUM IN CONJUNCTION WITH WAVELENGTH	NELSON, J. WILLIAM	90437601	NEW	76/04/12	\$30,000
FLORIDA, UNIV. OF GAINESVILLE	1BC511 A GUIDE FOR COMPREHENSIVE PLANNING FOR CONTROL OF URBAN STORM & COMBINED SEWER RUNOFF	HUBER, WAYNE C.	80241102	INCR	75/01/06	\$42,882
			80241102	INCR	76/05/24	\$25,000
FLORIDA, UNIV. OF GAINESVILLE	1HB617 SIMULATION OF NITROGEN MOVEMENT AND TRANSFORMATION IN THE PLANT ROOT ZONE	DAVIDSON, J. M.	80360702	CONT	75/02/19	\$37,244
FLORIDA, UNIV. OF GAINESVILLE	1BB610 EVALUATION OF WASTE CITRUS ACTIVATED SLUDGE IN POULTRY FEEDS	DAMON, B. L.	80399701	NEW	76/06/25	\$23,537
FLORIDA, UNIV. OF GAINESVILLE	1BA607 VITAL HAZARDS FROM SOIL APPLIED MUNICIPAL WASTES	GERBER, J. F.	80451901	NEW	75/05/11	\$10,000

APPLICANT	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARDED
F L O R I D A						
** RESEARCH **						
MIAMI, UNIV. OF CORAL GABLES	1A2017 CHARACTERIZATION OF METHANOL/GASOLINE BLENDS AS A JOINTIVE FUEL	ANT, ROBERT P.	80340102	INCR	76/01/22	\$534
MIAMI, UNIV. OF CORAL GABLES	1A615 STORAGE & EXCRETION OF HALOGENATED & NON-HALOGENATED ORGANOSPHORUS PESTICIDES IN ANIMALS & MAN	DAVIES, JOHN E	80435301	NEW	76/01/02	\$75,427
MIAMI, UNIV. OF MIAMI	1A615 WATER QUALITY & MANGROVE ECOSYSTEM DYNAMICS	SNEDAKER, SAMUEL	80435301	INCR	76/04/29	\$30,000
MIAMI, UNIV. OF MIAMI	1A6508 DENSITY DEPENDENT FACTORS AND THEIR EFFECTS ON GROWTH AND SURVIVAL OF SPOTTED SEATROUT	HOUE, F. D.	80451901	NEW	76/06/07	\$33,349
WEST FLORIDA, UNIV. OF PENSACOLA	EME625 CYCLING OF XENOTOXICS THROUGH ESTUARINE AND MARINE SEDIMENTS	DIASARI, CHARLES N.	80445801	NEW	76/03/08	\$99,840
WEST FLORIDA, UNIV. OF PENSACOLA	EME625 TOXIC SUBLETHAL & LATENT EFFECTS OF SELECTED PETROLEUM HYDROCARBONS & BARIUM SULFATE	RAYGA, RAO, K.	80454131	NEW	76/04/26	\$94,384
** DEMONSTRATION **						
FLORIDA GAME & FRESH WATER FISH COMM. TALLAHASSEE	2EH412 LAKE APOPKA RESTORATION PROJECT	FRYE, N. F.	80419101	NEW	76/01/08	\$143,900
** TRAINING **						
FLORIDA DEPT OF ENVIRONMENTAL REG. TALLAHASSEE	2HK572 SOLID WASTE TRAINING GRANT		00417201	NEW	76/02/03	\$5,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
FLORIDA						
•• FELLOWSHIPS •• FLORIDA STATE UNIV. TALLAHASSEE	2BK159 M.S.	MCANINCH, M. A.	91099201	NEW	76/04/27	\$4,053
			91089201	INCR	76/06/01	\$2,447
FLORIDA STATE UNIV. TALLAHASSEE	2BK159 M.S./BIOLOGY	REDIG, MICHAEL X.	91093301	NFM	76/06/14	\$5,000
FLORIDA, UNIV. OF GAINESVILLE	2BK139 M.S./ENVRN. ENGR.	GENOBLE, A. L.	91090301	NEW	76/06/01	\$10,260
FLORIDA, UNIV. OF GAINESVILLE	2BK139 M.S./ENGR.	NUDD, G.	91081601	NEW	76/06/07	\$8,046
FLORIDA, UNIV. OF GAINESVILLE	2BK139 M.S./ENGR.	GEIGER, J. R.	91091901	NEW	76/06/10	\$9,046

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
G E O R G I A						
** RESEARCH ** ATLANTA UNIV. CTR. ATLANTA	1HD622 STUDIES ON THE MUTAGENICITY OF CHEMICAL CARCINOGENS	SHEEHY, RONALD J.	80420401	NEW	76/04/29	\$48,600
ATLANTA UNIV. CTR. ATLANTA	1HD622 DEVELOPMENT OF METHODS FOR STABILIZATION OF PYROLYTIC OILS	POLK, M.	80444001	NEW	76/05/26	\$64,372
CLARK COLLEGE ATLANTA	1AA503 STUDY OF VAPOR PRESSURES OF SYSTEMS FORMING ATMOSPHERIC AEROSOLS	BROWN, G. B.	80447001	NEW	76/02/26	\$29,914
GEORGIA INST. OF TECH. ATLANTA	FHE624 DEVELOPMENT OF PROTOTYPE PORTABLE SYSTEM FOR PYROLYSIS OF AGRICULTURAL WASTES INTO FUELS & PRODUCT	TATUM, JOHN	80343001	INCR	76/05/26	\$74,000
GEORGIA INST. OF TECH. ATLANTA	1DC618 CONTROLLED LANDFILL STABILIZATION BY LEACHATE RECYCLE	POHLAND, FREDERICK G.	80395301	INCR	76/03/29	\$15,000
GEORGIA INST. OF TECH. ATLANTA	1DC618 UTILIZATION & STABILIZATION OF PYROLYTIC OILS FROM PYROLYSIS OF AGRICULTURAL, MUNICIPAL & OTHER WASTES	KNIGHT, JAMES A.	80441601	NEW	76/05/20	\$51,750
GEORGIA INST. OF TECH. ATLANTA	1AA603 INVESTIGATION OF CH REACTIONS OF IMPORTANCE IN PERTURBED TROPOSPHERE	DAVIS, D. O.	80452901	NEW	76/06/30	\$39,933
GEORGIA STATE UNIV. ATLANTA	1FA615 EFFECTS OF POLLUTANTS ON MICROBIAL ACTIVITIES IN ESTUARINE SURFACE FILMS	ARMSTRONG, D. G.	80447701	NEW	76/04/21	\$50,300
GEORGIA UNIV. OF ATHENS	1HB617 FATE OF PESTICIDES IN WATER & SOIL-SURFACTANT EFFECT ON PESTICIDE PHOTOCHEMISTRY	NEUTALA, R.	80295902	INCR	76/05/26	\$59,635
GEORGIA UNIV. OF ATHENS	1HB617 ENVIRONMENTAL AND ECONOMIC IMPACT OF PLACING SOIL BANK MARGINAL AND SUBMARGINAL LAND	BRANNEN, S. J.	80451301	NEW	76/04/28	\$75,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FFLLTM	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
G E O R G I A						
** TRAINING **						
ATLANTA UNIV. CTR. ATLANTA	28K159 UNDERGRADUATE TRAINING PROGRAM IN WATER POLLUTION CONTROL DESIGN ENGR.	MERIDETH, C. W.	90050503	CONT	76/06/11	\$30,004
GEORGIA ENVIRONMENTAL PROTECTION DIV ATLANTA	28P158 GRANT IS DESIGNED TO PROVIDE TRAINING FOR WWT PLANT OPERATORS	J LEONARD LEDBETTER, D	00419601	NEW	76/04/21	\$29,404
SAVANNAH STATE COLLEGE SAVANNAH	28P158 WATER POLLUTION CONTROL-OPERATOR TRAINING	SCOTT, WILTON	90051901	INCR	76/05/26	\$10,044

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
H A W A I I						
** TRAINING **						
HAWAII DEPT. OF HEALTH HONOLULU		TULANG, DENNIS	00912301	NEW	76/06/22	\$21,000
	STATEWIDE WASTEWATER TREATMENT PLANT OPERATOR TRAINING PROGRAM					
** FELLOWSHIPS **						
HAWAII, UNIV. OF HONOLULU	2BK159 M.S./CIVIL ENGR. & OCEAN ENGR.	BILLS, DAVID B.	91076901	NEW	76/02/03	\$4,392
HAWAII, UNIV. OF HONOLULU	2BK159 M.S./CIVIL ENGR.	LAM, A. A.	91091301	NEW	75/05/05	\$2,510
HAWAII, UNIV. OF HONOLULU	2BK159 M.S./PUBLIC HEALTH	CANLAS, L. A.	91094001	NEW	76/06/03	\$6,500

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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I D A H O

** TRAINING **

ID DEPT. OF HEALTH & WELFARE
BOISE

280158
WASTEWATER OPERATOR TRAINING PROGRAM

WILTON G. KLEIN, DIREC

00010801

NEW

75/05/01

\$20,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
ILLINOIS						
** RESEARCH **						
CANADA DEPT OF ENVIRONMENT OTTAWA	28M155 FINANCIAL ASSISTANCE BY USEPA TO CANADA IN SUPPORT OF WATER QUALITY SAMPLING CRUISES ON LAKE SUPERIOR	DR E BENNETT SCI	00520701	INCR	75/03/17	\$5,000
GOVERNORS STATE UNIV PARK FOREST SCOT	28M155 AN EXPERIMENTAL STUDY OF LAKE LOADING	W E ENGEBRETSON PRES	00530101	NEW	76/06/16	\$54,119
ITT RES. INST. CHICAGO	1A4603 A STUDY OF THE IDENTITY & SOURCES OF ATMOSPHERIC AFROSOLS	GRAFTZ, RONALD G.	30337803	INCR	75/04/28	\$7,300
ILLINOIS INST. OF TECH. CHICAGO	188610 SUSCEPTIBILITY OF METALS TO TREATMENT IN COMBINED INDUSTRIAL-MUNICIPAL SYSTEM	PATTERSON, J. W.	80453801	NEW	76/06/18	\$224,735
ILLINOIS, UNIV. OF URBANA	1E4015 DESIGN & EVALUATION OF TERRESTRIAL MODEL ECOSYSTEM FOR EVALUATION OF SUBSTITUTE PESTICIDE CHEMICALS	WETCALF, ROBERT L.	80324902	INCR	75/05/05	\$74,000
ILLINOIS, UNIV. OF URBANA	1CC614 ACTIVATED CARBON ADSORPTION OF TRACE ORGANIC COMPOUNDS	SHVEYINK, V. L.	80347302	CONT	76/01/07	\$68,781
ILLINOIS, UNIV. OF CHICAGO	1CC614 HEALTH EFFECTS OF HUMAN EXPOSURE TO BARIUM IN DRINKING WATER	BRENNIMAN, GARY R.	90391801	INCR	75/03/08	\$9,601
ILLINOIS, UNIV. OF URBANA	EHE625 SAMPLING FREQUENCY FOR WATER QUALITY TRENDS	LARSON, THURSTON E.	80433701	NEW	76/06/18	\$100,000
ILLINOIS, UNIV. OF URBANA	1H8617 RESEARCH ON LIVESTOCK FEEDLOT RUNOFF CONTROL BY VEGETATIVE FILTERS	VANDERHOLM, DALE H.	80434101	NEW	75/01/05	\$75,355
ILLINOIS, UNIV. OF URBANA	FHF623 MINERAL MATTER IN COAL	GLUSKOTER, HAROLD J.	80440301	NEW	76/03/17	\$50,958

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
I L L I N O I S						
** TRAINING ** ILLINOIS, UNIV. OF URBANA	28K159 WATER QUALITY CONTROL	ENGFLBPECHT, R. S.	90931205	INCR	76/06/11	\$31,200
SOUTHERN ILLINOIS UNIV. EDWARDSVILLE	28P159 NPDES EFFLUENT MONITORING PROCEDURES TRAINING PROGRAM	HORD, WILLIAM F.	90953401	INCR	75/04/27	\$25,391
** FELLOWSHIPS ** ILLINOIS, UNIV. OF URBANA	28K139 M.S./ENVRN. ENGR.	HUTTER, G. M.	91090401	NEW	76/06/25	\$7,647
ILLINOIS, UNIV. OF URBANA	28K139 M.S./ENVRN. ENGR.	SZURGOT, A. M.	91031401	NEW	76/06/16	\$7,647
ILLINOIS, UNIV. OF URBANA	28K159 M.S./ENVRN. ENGR.	ANDERSON, J. L.	91095301	NEW	76/04/29	\$5,735

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
PURDUE RES. FDN. WEST LAFAYETTE	18D612 DEVELOP WATER QUALITY PROFILES FOR CADDISFLIES TRICHOPTERA	HARRIS, TODD	80331901	NEW	75/05/03	\$6,000
PURDUE RES. FDN. WEST LAFAYETTE	1CC614 EFFECTS OF HALOGENATED AROMATIC HYDROCARBONS ON METABOLISM OF FOREIGN ORGANIC COMPOUNDS	CARLSON, GARY P.	80432801	INCR	76/03/13	\$1,000
** DEMONSTRATION **						
CROWN CHEMICAL CO., INC. INDIANAPOLIS	18B610 CLOSED LOOP RECYCLE SYSTEM FOR WASTE ACID PICKLE LIQUOR	PETERSON, JOSEPH C.	90335801	INCR	76/04/14	\$25,000
** TRAINING **						
NOTRE DAME, UNIV. OF NOTRE DAME	2NK159 JOINT PROGRAM IN ENVRN. ENGR. & LAW	IRVINE, ROBERT L.	90006505	INCR	76/02/12	\$16,394
** FELLOWSHIPS **						
BALL STATE UNIV. MUNCIE	29K159 M.S./URBAN & REGIONAL PLANNING	CHAYER, M. R.	91057401	INCR	76/01/29	\$2,108
PURDUE UNIV. WEST LAFAYETTE	29K159 M.S./ENVRN. ENGR.	LOUGHEED, S. O.	91092801	NFW	76/05/26	\$4,725

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APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
IOWA STATE UNIV. AMES	1H8617 DEVELOPMENT & TESTING OF MATH MODELS AS MGMT. TOOLS FOR AGRICULTURAL NON-POINT POLLUTION CONTROL	JOHNSON, HOWARD P.	80410201	INCR	76/01/06	\$27,137
** TRAINING **						
ASSOCIATION OF BOARDS OF CERTIFICATION AMES	28P159 EVALUATION OF ABC CERTIFICATION PROGRAM IMPLEMENTATION	SEIDEL, H.	90058901	NEW	76/04/27	\$29,700
IOWA DEPT OF ENVIRONMENTAL QUALITY DES MOINES	28P159 WATER & WASTE WATER TREATMENT CERTIFICATION AND TRAINING PROGRAM	CRANE, LARRY E EXEC DI	00709301	NEW	76/06/11	\$10,000
IOWA DEPT. OF ENVIRONMENTAL QUALITY DES MOINES	2H8572 MOBILE OPERATOR TRAINING PROGRAM	CRANE, LARRY E EXEC DI	00707701	NEW	76/01/15	\$20,000
IOWA STATE UNIV. AMES	28K159 ENGINEERING DESIGN OF WATER POLLUTION CONTROL SYSTEMS	BAUMANN, F. ROBERT	90017608	INCR	76/06/11	\$25,202
KIRKWOOD COMMUNITY COLLEGE CEDAR RAPIDS	XH2710 NEEDS STUDY TO DEVELOP A PROTOTYPE NATIONAL INFORMATION SYSTEM FOR OCCUPATIONAL EDUCATION	BALLANTYNE, S A SUPER	00709201	NEW	76/05/24	\$1
NATIONAL FIELD RESEARCH CENTER INC. IOWA CITY	2AK137 NATIONAL ENVIRONMENTAL/ENERGY WORKFORCE ASSESSMENT	RENESH, R. L.	90059101	NEW	76/05/04	\$349,425
** FELLOWSHIPS **						
IOWA STATE UNIV. AMES	28K159 PH.D./SAN. ENGR.	ROBINSON, P.	91078401	NEW	76/03/08	\$4,632

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APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
K A N S A S						
** TRAINING ** DODGE CITY COMMUNITY COLLEGE DODGE CITY	2HK572 WASTEWATER TECHNOLOGY	NOYES, IRWIN A CHMN SC INSTRUCTIONAL PROGRAM	00707901	NEW	76/01/26	\$9,900
KANSAS DEPARTMENT OF HEALTH & ENVIRON TOPEKA	2HK572 DECISION MAKERS GRANT	GRAY, MELVILLE W DIR	00708301	NEW	76/04/23	\$5,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
K E N T U C K Y						
** RESEARCH ** KENTUCKY, UNIV. OF LEXINGTON	188610 METABOLISM OF CARBAMATE INSECTICIDES	NOROUGH, H. WYMAN	80230507	CONT	76/01/09	\$39,525
KENTUCKY, UNIV. OF LEXINGTON	188610 CHARGED MEMBRANE ULTRAFILTRATION AND SULFIDE PRECIPITATION TO TREAT NON FERROUS METAL	GRIEVES, R. R.	90456801	NEW	76/06/19	\$36,987
MURRAY STATE UNIV. MURRAY	100614 IDENTIFICATION OF ORGANIC COMPOUNDS IN TEXTILE PLANT EFFLUENTS	GORDON, MARSHALL	802396403	CONT	76/02/19	\$45,000
** DEMONSTRATION ** KENTUCKY DEPT. OF NATURAL RESOURCES FRANKFORT	EHE523 COAL MINE HAIL ROAD SEDIMENT CONTROL TECHNIQUES	MCCLAIN, D.A.	803395601	NEW	76/06/16	\$297,000
** TRAINING ** KENTUCKY DEPT OF NAT RES & ENVIR PROT FRANKFORT	20P158Z MANPOWER DEVELOPMENT GRANT FOR NPDES TRAINING & EVALUATION	WILLIAM S. FORESTER, D	00419101	NEW	76/05/27	\$14,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
L O U I S I A N A						
•• RESEARCH ••						
GRAMBLING STATE UNIV. GRAMBLING	IAA601 THE EFFECTS OF CADMIUM ON THE ULTRASTRUCTURE OF TYPE A SPERMATOGONIA	JORDAN, CHESTER L.	80315432	INCR	76/02/09	\$13,000
GULF SOUTH RES. INST. BATON ROUGE	EHF625 INVESTIGATION OF MATRIX INTERFERENCES FOR AAS TRACE METAL ANALYSES OF SEDIMENTS AFFECTED BY COAL COM	HICKMAN, MARY M.	80431701	NEW	76/01/29	\$53,646
LOUISIANA STATE UNIV. & ACM COLLEGE BATON ROUGE	ICG514 CARCINOGEN DETECTION IN PUBLIC WATER SUPPLIES & SOURCES WITH MAMMALIAN CELL MONITORS	PELON, WILLIAM	80019903	INCR	76/06/11	\$147,634
LOUISIANA STATE UNIV. & ACM COLLEGE BATON ROUGE	12G011 NITROGEN & PHOSPHORUS REACTIONS IN OVERLAND FLOW OF WASTE WATER	PATRICK, WM. H.	80351201	INCR	76/02/19	\$30,000
LOUISIANA TECH UNIV. RUSTON	1HB017 ENVIRONMENTAL IMPACT RESULTING FROM UNCONFINED ANIMAL PRODUCTION	ROBBINS, J. A. D.	80449701	NEW	76/04/14	\$59,560
NEW ORLEANS SEWERAGE & WATER BD. NEW ORLEANS	ICG014 EVALUATE TECHNIQUES & ECONOMICS IN REMOVING TRACE ORGANIC COMPOUNDS FROM NEW ORLEANS WATER SUPPLY	SULLIVAN, G. JOSEPH	80440401	NEW	76/02/25	\$239,700
SOUTHERN UNIV. BATON ROUGE	1HD622 IDENTIFICATION & QUANTIFICATION OF NONVOLATILE ORGANIC SUBSTANCES IN MUN. WATER SUPPLIES	SMALLEY, ARNOLD W.	80365001	NEW	76/05/26	\$49,320
•• TRAINING ••						
DELGADO JR COLLEGE BATON ROUGE	2RP159 MANPOWER TRAINING - WWT OPERATORS	MARVIN E THAMES PRFSD	00611501	NEW	76/01/26	\$12,000

APPLICANT	MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO.	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
18A609		910-ACCUMULATION OF TRACE ELEMENTS IN SELECTED MARINE ORGANISMS	HURST, JOHN W.	90265603	CONT	76/06/19	\$35,000
20M297		FEASIBILITY OF COMPOSTING RAW SEWAGE SLUDGE BY HIGH RATE SUCTION AERATION TECHNIQUES	JOSEPH, JOHN	80332301	INCR	76/04/29	\$20,000
10B054		MAINE STATE SOLID WASTE DEMO GRANT	EDWARD C. HOWES	00110301	NEW	76/06/15	\$45,000
20M412		UTILIZATION OF JUVENILE ALTERNIVES TO CONTROL A LAKE WATER QUALITY PROGRAM	ADAMS, WILLIAM R.	90427201	NEW	76/02/19	\$11,710
20K159		PH.D./FOREST RESOURCES	REID, WILLIAM F.	91072001	NEW	76/02/12	\$6,500

MAINE

•• RESEARCH ••

MAINE DEPT. OF MARINE RESOURCES
AUGUSTA

•• DEMONSTRATION ••

BANGOR, CITY OF
BANGOR

MAINE DEPT. OF ENVIRON. PROTECT
AUGUSTA

MAINE DEPT. OF ENVIRON. PROTECTION
AUGUSTA

•• FELLOWSHIPS ••

MAINE, UNIV. OF
ORONO

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
M A R Y L A N D						
** RESEARCH **						
ENTOMOLOGICAL SOCIETY OF AMERICA COLLEGE PARK	2EH183 MODERN APPROACHES TO PEST CONTROL	RAY, ERNEST C.	90421101	NEW	76/06/01	\$10,000
JOHNS HOPKINS UNIV. BALTIMORE	1CC614 BIOLOGICAL EVALUATION OF THE BENEFITS OF MAINTAINING A CHLORINE RESIDUAL IN PUBLIC WATER SYSTEMS	KRUSE, CORNELIUS W.	80430701	NEW	75/03/26	\$75,393
** DEMONSTRATION **						
BALTIMORE, CITY OF BALTIMORE	2DH297 DEMONSTRATION OF A PYROLYSIS RESOURCE RECOVERY SOLID WASTE	ZULVER, ELLIOT	90153301	INCR	76/01/21	\$1,000,000
MARYLAND ENVIRON. SERVICES ANNAPOLIS	2DH297 RESOURCE RECOVERY IMPLEMENTATION GRANT	WILLEY, C. R.	90478601	NEW	76/06/30	\$50,000
** TRAINING **						
MARYLAND, UNIV. OF COLLEGE PARK	2BK159 FOUR-YEAR WATER & WASTEWATER TECHNOLOGY CURRICULUM DEVELOPMENT	WOCKENFUSS, WILLIAM	90056801	INCR	76/06/10	\$70,000
MD DEPT OF NAT RES ANNAPOLIS	2BP159 TRAINING WWT PLANT OPERATORS	ANDREWS, THOMAS C.	00311102	CONT	76/06/17	\$12,000
** FELLOWSHIPS **						
JOHN HOPKINS UNIV. BALTIMORE	2BK159 M.S.	WOOD, D. M.	91091701	NEW	76/06/01	\$1,335
JOHN HOPKINS UNIV. BALTIMORE	2BK159 M.S.	CLAPKE, J. P.	91094801	NEW	76/06/11	\$3,200
JOHNS HOPKINS UNIV. BALTIMORE	2BK159 M.S./HEALTH SERVICES	DERTEUX, WALTER P.	91094601	NEW	76/05/26	\$6,054

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
ARTHUR D. LITTLE, INC. CAMBRIDGE	188510 PROCESS FOR ACTIVE CARBON REGENERATION AND FOR RECOVERY OF HAZARDOUS PESTICIDE WASTES	DE FILIPPI, R. P.	90455401	NEW	76/05/14	\$149,464
HARVARD COLLEGE CAMBRIDGE	1CC614 IDENTIFICATION & DETECTION OF WATER-BORNE VIRUSES BY IMMUNOELECTRONIC METHODS	NICHOLS, R. L.	80336002	CONT	76/03/12	\$59,874
			80336002	INCR	76/06/03	\$40,000
HARVARD UNIV. CAMBRIDGE	1AB017 RESEARCH ON RELATIONSHIPS BETWEEN LAND USE, TRANSPORTATION & URBAN AIR QUALITY	KAIN, JOHN F.	90299902	CONT	76/05/20	\$110,716
HARVARD UNIV. CAMBRIDGE	1CC614 ORGANIC N-CHLORO COMPOUNDS IN CHLORINATION OF WATER SUPPLIES-THEIR FORMATION & SIGNIFICANCE	MORRIS, J. CARROLL	90353102	CONT	76/04/28	\$52,945
MASSACHUSETTS, UNIV. OF AMHERST	1NC611 SHORT COURSE ON APPLICATION OF STORMWATER MANAGEMENT MODELS	DEGIANO, FRANCIS	90306901	INCR	76/04/09	\$3,409
MASSACHUSETTS, UNIV. OF AMHERST	188510 LOW WASTEWATER POTATO STARCH/PROTEIN PRODUCTION PROCESS	ROSENAU, J. R.	90371202	CONT	76/06/07	\$20,300
NORTHEASTERN UNIV. ROSTON	1RC611 CHARACTERIZATION OF SOLIDS BEHAVIOR IN AND VARIABILITY TESTING OF SELECTED CONTROL TECHNIQUES	PLANC, F. C.	90457801	NEW	76/05/24	\$168,164
SOUTHEASTERN MASSACHUSETTS UNIV. N. DARTMOUTH	194509 DEVELOPMENT OF INTERACTIVE SYSTEM TO STUDY SUB-LETHAL EFFECTS OF POLLUTANTS ON BEHAVIOR OF ORGANISMS	GRAVES, JOHN O. B.	90324402	INCR	76/05/03	\$30,000
WOODS HOLE OCEANOGRAPHIC INST. WOODS HOLE	188610 BIOLOGICAL RECOVERY FOLLOWING AN OIL SPILL	SANDERS, HOWARD	80130102	INCR	76/04/09	\$9,922

M A S S A C H U S E T T S

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** DEMONSTRATION ** SOMERVILLE, CITY OF SOMERVILLE	204297 DEMONSTRATION OF MULTI-MATERIAL SOURCE SEPARATION IN AN URBAN AREA	REILLY, DAVID	80369301	INCR	76/01/07	\$4,370
M.R. GRAPE & CO. LEXINGTON	188610 TREATMENT OF WASTEWATERS FROM ADHESIVES & SEALANTS MANUFACTURE BY ULTRAFILTRATION	PECEVICH, JOHN	90435001	NEW	76/01/12	\$75,000
WOODS HOLE OCEANOGRAPHIC INST. WOODS HOLE	180611 CAPE CODE WASTEWATER RENOVATION & RETRIEVAL SYSTEM	KETCHUM, ROSTWICK M.	80203702	INCR	76/04/12	\$72,010
** TRAINING ** ACTION FOR BOSTON COMMUN. DEVELOPMENT BOSTON	280158 PROGRAM FOR ENVIRONMENTAL PLANNING	DEPIETRO, L.	90058801	NEW	75/05/20	\$4,325
BOSTON COLLEGE WESTON	280159 STATE STAFF EDUCATION AND TRAINING	THEODORE M. RIDER	00139701	NEW	76/03/19	\$13,799
NORTHEASTERN UNIV. BOSTON	280159 TRAINING IN WATER QUALITY ENGINEERING	COCHRANE, JOHN	00108701	INCR	76/04/29	\$13,073
ROXBURY-NORCHESSTER BEAUT.PRG. BOSTON	280159 ENVIRONMENTAL OUTREACH PROGRAM	AUGUSTA H. BAILEY	90019004	INCR	76/06/09	\$24,503
TUFTS UNIV. MEDFORD	280159 GRADUATE TRAINING FOR ENVIRONMENTAL ENGINEERING	HANES, N. BRUCE	90015209	INCR	75/05/07	\$32,400
** FELLOWSHIPS ** HARVARD UNIV. CAMBRIDGE	280159 U.S./CITY PLANNING	PEERSON, J.J.	91079401	NEW	75/03/25	\$5,920

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MASSACHUSETTS						
** FELLOWSHIPS **						
HARVARD UNIV. CAMBRIDGE	2AK139 M.S./CITY PLANNING	GROSSMANN, J. R.	91079501	NEW	76/05/26	\$6,820
HARVARD UNIV. CAMBRIDGE	2AK139 M.S./CITY PLANNING	KOWALIK, J. T.	91090501	NEW	76/05/26	\$6,820
HARVARD UNIV. CAMBRIDGE	2AK139 M.S.	TURNER, S.J.	91092501	NEW	76/06/01	\$6,820
HARVARD UNIV. CAMBRIDGE	2AK139 M.S.	CONLEY, E. M.	91083401	NEW	76/06/01	\$6,820
HARVARD UNIV. CAMBRIDGE	2AK139 M.S./CITY PLANNING	STEWART, R. B.	91094901	NEW	76/05/26	\$6,820
HARVARD UNIV. CAMBRIDGE	2AK139 M.S./CITY PLANNING	LESSER, E. M.	91099301	NEW	76/05/26	\$6,820
MASSACHUSETTS, UNIV. OF AMHERST	2AK139 M.S./PUBLIC HEALTH	ROURKE, KAREN L.	91092501	NEW	76/06/11	\$4,307
NORTHEASTERN UNIV. BOSTON	2AK139 MS/ENVRN. ENGR./AIR POLLUTION	BOISSELLE, ROBERT A.	91038101	INCR	76/06/11	\$2,035
NORTHEASTERN UNIV. BOSTON	2AK139 M.S./CIVIL ENGR.	CAPONE, STEPHEN V.	91038201	INCR	76/06/01	\$2,035
NORTHEASTERN UNIV. BOSTON	2AK139 M.S./CIVIL ENGR./AIR POLLUTION	MAHER, MICHAEL J.	91038701	INCR	76/06/01	\$2,035

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** FELLOWSHIPS **						
NORTHEASTERN UNIV. BOSTON	2AK139 M.S./CIVIL ENGR./AIR POLLUTION	CL. ALLEN M.	91039901	INCR	76/06/01	\$2,035
NORTHEASTERN UNIV. BOSTON	2AK139 M.S./CIVIL ENGR./AIR POLLUTION	DECK, DOUGLAS P.	91039101	INCR	76/06/11	\$2,035
NORTHEASTERN UNIV. BOSTON	2AK139 M.S./CIVIL ENGR./AIR POLLUTION	KASHINSKY, MORRIS M.	91039301	INCR	75/05/01	\$2,035
NORTHEASTERN UNIV. BOSTON	2AK139 M.S./ENVIRON. ENGR./AIR POLLUTION	MCINNES, ROBERT G.	91039701	INCR	76/06/01	\$2,035
NORTHEASTERN UNIV. BOSTON	2AK139 M.S./CIVIL ENGR.	CHALPIN, RICHARD J.	91042101	INCR	75/05/11	\$2,035
NORTHEASTERN UNIV. BOSTON	2AK139 M.S./ENVIRON. ENGR.	CHRETTEN, R. R.	91086401	NEW	76/06/01	\$2,840
NORTHEASTERN UNIV. BOSTON	2AK139 M.S./ENVIRON. ENGR.	DEGASPIELE, S. A.	91086901	NEW	76/05/18	\$2,540
NORTHEASTERN UNIV. BOSTON	2AK139 M.S.	PAWLOWSKI, E. J.	91097101	NEW	76/04/16	\$2,712
NORTHEASTERN UNIV. BOSTON	2AK139 M.S.	HAAS, G. S.	91091901	NEW	76/05/21	\$2,840
TUFTS UNIV. MEDFORD	2AK139 M.S./URBAN, SOCIAL & ENVIRON. POLICY	NEWLANDS, E. J.	91097901	NEW	75/05/03	\$2,950

M A S S A C H U S E T T S

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
M I C H I G A N						
** RESEARCH **						
CRANFORD INST. OF SCIENCE BLOOMFIELD HILLS	19A609 SURVEY OF NUTRIENTS AND HAZARDOUS SUBSTANCE IN SAGINAW BAY	ROWEN, ROBERT	80444201	NEW	75/04/27	\$39,999
MICHIGAN DEPT. OF NATURAL RESOURCES LANSING	19A609 LAPVAL FISH SURVEY IN MICHIGAN WATERS OF LAKE ERIE	NAVBRANT, R. C.	90452201	NEW	76/05/21	\$42,177
MICHIGAN STATE UNIV. EAST LANSING	19B617 RESISTANCE HAZARDS OF JUVENILE HORMONE MIMICS	BROWN, A. W.	90312433	CONT	75/04/28	\$15,385
MICHIGAN STATE UNIV. EAST LANSING	19B617 UTILIZATION OF PEST ECOSYSTEM MODELS IN PEST MANAGEMENT PROGRAMS	HOEFMAN, J. W.	90379502	CONT	76/04/28	\$86,991
MICHIGAN STATE UNIV. EAST LANSING	19A615 ECOSYSTEM RESPONSES TO ALTERNATIVE PESTICIDES IN THE ENVIRN.: A SYSTEMS APPROACH	BROWN, A.W.A.	80325902	CONT	75/04/05	\$120,000
MICHIGAN STATE UNIV. EAST LANSING	19A609 DEVELOPMENT OF MANAGEMENT MODELS FOR STREAM ECOSYSTEMS	ROLING, R.H.	90442431	NEW	76/02/11	\$39,974
MICHIGAN STATE UNIV. EAST LANSING	19A608 COLF, R. A. LAPVAL FISH DISTRIBUTIONS AND MORTALITY AT A STEAM ELECTRIC PLANT ON LAKE ERIE	COLF, R. A.	80451701	NEW	75/04/25	\$39,547
MICHIGAN, UNIV. OF ANN ARBOR	19A609 CHARACTERISTICS OF BENTHIC ALGAL COMMUNITIES IN THE UPPER GREAT LAKES	STOERNER, E. F.	90303702	CONT	76/05/20	\$27,000
MICHIGAN, UNIV. OF ANN ARBOR	19C614 EFFECTIVENESS OF ACTIVATED CARBON FOR REMOVAL OF TOXIC &/OR CARCINOGENIC COMPOUNDS FROM WATER SUPPLY	WEBER, WALTER J.	80436901	NEW	75/03/11	\$99,540
MICHIGAN, UNIV. OF ANN ARBOR	19A609 NUTRIENT AND PLANKTON RELATIONSHIPS IN NORTHERN LAKE MICHIGAN	SCHLESKE, C. L.	90450301	NEW	76/05/21	\$303,521

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
M I C H I G A N						
** RESEARCH **						
OIL SPILL CONTROL ASSOC. OF AMERICA SOUTHFIELD	FHE624 THIRD NATIONAL CONFERENCE ON CONTROL OF HAZARDOUS MATERIAL SPILLS	USHER, DAVID	90392301	INCR	76/06/16	\$12,450
** DEMONSTRATION **						
DETROIT, CITY OF DETROIT	20M297 NEGOTIATION ASSISTANCE FOR DETROIT'S RESOURCE RECOVERY SYSTEM	ABRAMS, C.	80478701	NEW	76/06/30	\$75,000
FORD MOTOR CO. DEARBORN	18B610 ELECTROLYTIC TREATMENT OF OILY WASTEWATER	GEALER, ROY L.	80417401	NEW	76/04/12	\$100,000
HOLLEY CAPRAMETOR WARREN	18B610 TREATMENT OF METAL FINISHING WASTE BY SULFIDE PRECIPITATION	FOWLER, F. K.	80454801	NEW	76/06/22	\$40,000
INGHAM CNTY. BD. OF COMM. WASCON	28H412 LAKE LANSING DREDGING & RESTORATION	GROBE, EDWARD E.	80423201	NEW	76/04/13	\$800,000
** TRAINING **						
MICHIGAN STATE UNIV. EAST LANSING	28P159 WATER/WASTEWATER MIDDLE MANAGEMENT HOME STUDY CORRESPONDENCE COURSE	DEHAVEN, CLARK E.	90021901	INCR	76/04/09	\$30,013
MICHIGAN STATE UNIV. EAST LANSING	28K159 TRAINING IN AQUATIC POLLUTION ECOLOGY	ROELOFS, E. W.	90033105	INCR	76/04/16	\$3,840
** FELLOWSHIPS **						
MICHIGAN, UNIV. OF ANN ARBOR	28K159 PH.D./NATURAL RESOURCES	SOMMERSTROM, SARI JANE	91070501	NEW	75/05/03	\$1,557
MICHIGAN, UNIV. OF ANN ARBOR	28K159 M.S./PUBLIC HEALTH	GANDARA, NORMA	91071601	NEW	76/05/20	\$5,007

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
M I C H I G A N						
** FELLOWSHIPS ** MICHIGAN, UNIV. OF ANN ARBOR	28K159 M.S./SAN. ENGR.	TOMEI, NINA M.	91072201	NEW	76/03/17	\$5,000
MICHIGAN, UNIV. OF ANN ARBOR	28K159 M.S./WATER RESOURCES SCIENCE	DAVILA, MARIA	91078301	NEW	76/04/14	\$6,500

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MINNESOTA						
** RESEARCH **						
MINNESOTA STATE DEPT. OF HEALTH MINNEAPOLIS	ICC614 FEASIBILITY ASSESSMENT OF POTENTIAL STUDIES TO DET. HEALTH IMPACT OF FILTERING ASBESTIFORM FIBERS	LAWSON, W. R.	80459801	NEW	76/05/25	\$27,454
MINNESOTA, UNIV. OF ST. PAUL	2EH155 EFFECT OF NEMADJI RIVER INPUT IN LAKE SUPERIOR	M SYDOR PROF	00528601	NEW	76/02/26	\$32,000
MINNESOTA, UNIV. OF MINNEAPOLIS	1AA601 DEVELOPMENT OF BASIC AEROSOL STANDARDS	LIU, BENJAMIN Y.H.	80130105	INCR	75/05/18	\$19,993
MINNESOTA, UNIV. OF MINNEAPOLIS	19A608 EFFECT OF CYANIDE ON FRESHWATER FISH AND INVERTEBRATES	SMITH, LLOYD L.	90291403	CONT	76/02/23	\$65,022
MINNESOTA, UNIV. OF MINNEAPOLIS	1AA601 FORMATION OF ATMOSPHERIC AEROSOLS	WHITBY, KENNETH T.	90291403	INCR	76/03/12	\$33,494
MINNESOTA, UNIV. OF ST. PAUL	EHE625 FORMATIONS OF ATMOSPHERIC AEROSOLS	WHITBY, KENNETH T.	90395102	CONT	76/05/20	\$239,450
MINNESOTA, UNIV. OF ST. PAUL	1AA601 EFFECTS OF H2SO4 AEROSOL ON VEGETATION	KRUPA, S. V.	90429101	NEW	75/03/02	\$30,300
MINNESOTA, UNIV. OF ST. PAUL	ICC614 OPTICAL DETECTION OF ASBESTIFORM PARTICLES IN FINISHED DULUTH DRINKING WATER	SYDOR, MICHAEL	90436101	NEW	76/02/19	\$57,409
MINNESOTA, UNIV. OF MINNEAPOLIS	EHE625 EFFECT OF TEMPERATURE ON GROWTH AND SURVIVAL OF WHITE SUCKER	SMITH, LLOYD L.	90450101	NEW	75/05/15	\$50,298

APPLICANT	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MINNESOTA, UNIV. OF ST. PAUL	1A6601 DEVELOPMENT OF CHRONOPHYSIOLOGIC METHODS WITH REFERENCE TO CARDIOPULMONARY CONDITIONS	MALBERG, F.	80451201	NEW	75/05/05	\$60,307
MINNESOTA, UNIV. OF ST. PAUL	28H412 ALBERT LEA LAKE RESTORATION PROGRAM	BELSHAM, MILN	80423101	NEW	76/01/08	\$302,900
MINNEAPOLIS, CITY OF MINNEAPOLIS	28H412 A STUDY OF URBAN DRAINAGE AND ITS EFFECTS ON THE MINNEAPOLIS CHAIN OF LAKES	SMITH, PERRY D.	80426001	NEW	76/01/08	\$179,000
MINNESOTA POLLUTION CONTROL AGENCY POSEVILLE	20H297 CHEMICAL WASTE LANDFILL DEMONSTRATION GRANT	SILVAGNI, R. A.	80374402	CONT	76/06/14	\$1,286,921
MINNESOTA, UNIV. OF ST. PAUL	20H297 MONITORING OF ST. PAUL SOLID WASTE BALEFILL SITE	THOMPSON, FAY M.	80477501	NEW	76/06/22	\$24,806
NORTHERN STATES POWER CO. MINNEAPOLIS	EM6524 BENEFICIAL USES OF WARM WATER FROM CONDENSERS OF ELECTRIC GENERATING PLANTS	STANSFIELD, RUSSELL V.	80377001	INCR	76/03/12	\$100,000
MINNESOTA, UNIV. OF MINNEAPOLIS	2AK139 PH.D./ENVRN. HEALTH	RITCHIE, I. M.	91059001	INCR	76/06/09	\$948
MINNESOTA, UNIV. OF MINNEAPOLIS	2AK139 M.S.	WYLIF, J. J.	91080301	NEW	76/06/16	\$8,070
MINNESOTA, UNIV. OF MINNEAPOLIS	2AK139 M.S./PUBLIC HEALTH	MEYER, K. A.	91090501	NEW	76/06/16	\$8,070

APPLICANT	MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** FELLOWSHIPS **							
MINNESOTA, UNIV. OF	MINNEAPOLIS	2AK139 M.S./PUBLIC HEALTH	MADOLE, S. H.	91094801	NFW	76/05/70	\$8,070
MINNESOTA, UNIV. OF	MINNEAPOLIS	2RK159 M.S.	HANSEN, G. W.	91087301	NFW	76/04/28	\$6,500
MINNESOTA, UNIV. OF	MINNEAPOLIS	2RK159 B.A.	JAKES, D. L.	91093901	NFW	76/06/03	\$4,155

MINNESOTA

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MISSISSIPPI						
** RESEARCH ** ALCORN STATE UNIV. LOHMAN	IMB517 OVERLAND RECYCLING SYSTEM FOR ANIMAL WASTE TREATMENT	GPIC, M.E.	90233603	CONT	76/06/11	\$12,929
GULF COAST RES. LAB. OCEAN SPRINGS	IF6615 INSECTICIDE PERSISTENCE IN NATURAL SEAWATER AS AFFECTED BY SALINITY, LIGHT, TEMPERATURE & STIFFILITY	WALKER, M. W.	80384202	CONT	76/05/05	\$20,000
SOUTHERN MISSISSIPPI, UNIV. OF HATTIESBURG	EH6625 EFFECTS OF PETROLEUM COMPOUNDS ON ESTUARINE FISHES	MARTIN, BILLY J.	90452701	NEW	76/06/10	\$85,669
** TRAINING ** MISSISSIPPI STATE BOARD OF HEALTH JACKSON	2HK572 SOLID WASTE TRAINING GRANT	JACK MCMILLAN	00417501	NEW	76/03/04	\$5,000
MISSISSIPPI STATE UNIV. MISSISSIPPI ST.	2HK159 SCIENCE & PRACTICE OF WATER POLLUTION CONTROL	SHINDALA, ADRIAN	90031405	INCR	75/05/09	\$15,000
MISSISSIPPI VALLEY STATE UNIV. ITTA BENA	2BP158 WASTEWATER TREATMENT PLANT PERSONNEL TRAINING PROGRAM	SETHI, S. L.	90053001	INCR	76/03/08	\$19,952
** FELLOWSHIPS ** MISSISSIPPI STATE UNIV. MISSISSIPPI STAT	2HK159 M.S./SCIENCE	LEE, D. F.	91089901	NEW	76/04/27	\$4,400

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MISSOURI						
RESEARCH ** MISSOURI, UNIV. OF COLUMBIA	146617 RIONOMICS AND MANAGEMENT OF SOIL ARTHROPOD PESTS	FAIRCHILD, MARION L.	90256704	CONT	75/04/12	\$299,995
MISSOURI, UNIV. OF COLUMBIA	1CC516 BIOLOGICALLY MEDIATED CORROSION & DEGRADATION OF WATER QUALITY IN WATER DISTRIBUTION SYSTEMS	O'CONNOR, JOHN	90464401	NEW	75/03/17	\$57,825
WASHINGTON UNIV. ST. LOUIS	1A4603 TECHNIQUES FOR MEASUREMENT OF AEROSOL SIZE DISTRIBUTION & CARBON & SULFUR CONTENT	MACIAS, E. S.	90311503	CONT	76/06/07	\$50,000
WASHINGTON UNIV. ST. LOUIS	EMF525 SULFUR BUDGET IN LARGE PLUMES	MUSAR, P. B.	90397501	INCR	75/02/17	\$30,042
WASHINGTON UNIV. ST. LOUIS	EMF625 SULFUR BUDGET IN LARGE PLUMES	MUSAR, P. B.	90399602	CONT	76/03/17	\$114,000
WASHINGTON UNIV. ST. LOUIS	1F4615 STUDIES TO IMPROVE RELIABILITY & SENSITIVITY OF BACTERIAL MUTAGENESIS AS SCREEN ENVIRON. CARCINOGENESIS	CONNOR, BARRY	80439501	NEW	75/02/19	\$149,985
TRAINING ** CON SVC BROADCASTING - MID-AMERICA INC KANSAS CITY	2RP159 DOCUMENTARY PROGRAM ONE-HOUR ON MO RIVER POLLUTION	FUZY, ROBERT L GENERAL	00709501	NEW	76/05/05	\$62,100
DEPARTMENT OF NATURAL RESOURCES JEFFERSON CITY	2RP159 WATER POLLUTION CONTROL TRAINING PROGRAM	WILSON, JAMES L DIRECT	00705301	INCR	76/05/04	\$7,000
MISSOURI, UNIV. OF COLUMBIA	2RK157 TRAINING IN WATER SUPPLY & POLLUTION CONTROL	GRIGOROPoulos, S.	90012104	INCR	75/06/11	\$13,600
NEENSHAW WATER & WASTEWATER TECH SCHOOL NEENSHAW	2RK572 ADVANCED WASTE TREATMENT & OJ1- SPRINGFIELD MISSOURI	LAYTON, RONALD F DEFSI	00707501	NEW	76/01/26	\$13,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
ST LOUIS, JUNIOR COLLEGE DISTRICT ST LOUIS	2HK572 BASIC OPERATOR TRAINING COURSE	STEVENS, LEE A VICE CH	00708001	NEW	76/02/04	\$2,000
ST LOUIS, JUNIOR COLLEGE DISTRICT ST LOUIS	2HK572 NPDES: SELF MONITORING LAB PROCEDURES COURSE	GREENSFIELD, RICHARD K	00707601	NEW	76/01/26	\$6,416
THE CURATORS OF THE UNIV OF MISSOURI COLUMBIA	2BP158 DEVEL OF A COORDINATED STATE OPERATOR TRAINING PLAN	BEZONI, R M VP FIN & T	00708501	NEW	76/04/23	\$5,655
WATER & WASTEWATER TECH. SCH. NEOSHO	2BP159 ADVANCED OPERATOR TRAINING OF TRANSITION PROGRAM VETAPANS	LAYTON, RONALD F.	90049301	INCR	76/03/09	\$5,000
WATER & WASTEWATER TECH. SCH. NEOSHO	2BP159 SPECIALIZED TRAINING PROGRAM FOR FEDERAL & STATE PERSONNEL	LAYTON, RONALD F.	90050701	INCR	76/03/19	\$20,000
WATER & WASTEWATER TECH. SCH. NEOSHO	2BP159 NPDES EFFLUENT MONITORING TRAINING	LAYTON, RONALD F.	90051201	INCR	76/03/17	\$25,000
WASHINGTON UNIV. ST. LOUIS	2AK139 M.S./AIR POLLUTION	PATTERSON, DAVID E.	91058101	INCR	76/06/16	\$2,736
WASHINGTON UNIV. ST. LOUIS	2AK139 M.S./CHEM. ENGR.	FARLEY, MICHAEL L.	91060201	INCR	76/06/16	\$2,238
WASHINGTON UNIV. ST. LOUIS	2AK139 M.S./AIR POLLUTION ENGR.	PALEY, CYNTHIA G.	91063501	INCR	76/06/16	\$1,302
WASHINGTON UNIV. ST. LOUIS	2AK139 M.S./ENGR. MGMT.	MORSE, WILLIAM C.	91063201	INCR	76/06/11	\$2,254

MISSOURI

APPLICANT MUNICIPALITY

PROGRAM ELEMENT TITLE

PROJECT DIRECTOR / FELLOW

GRANT NO

TYPE OF GRANT

DATE OF AWARD

AMOUNT OF GRANT AWARD

M I S S O U R I

.. FELLOWSHIPS ..

WASHINGTON UNIV.
ST. LOUIS

28K159
M.S.

WERZ, F. W.

91058401

INCR

76/06/03

\$2,760

WASHINGTON UNIV.
ST. LOUIS

28K139
M.S./CHEMISTRY

SAVAGE, ALLEN L.

91071901

NEW

76/02/09

\$7,350

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH ** MONTANA COLLEGE BUTTE	1AR604 INVESTIGATION OF NEW TECHNIQUES FOR CONTROL OF SHELTER ARSENIC FLUE DUST WASTES	GALT, G. D.	80459501	NEW	76/06/22	\$145,239
MONTANA STATE UNIV. BOZEMAN	EHE625 USE OF LICHENS AS INDICATORS AND PREDICTORS OF AIR POLLUTION	EVERSMAN, SHARON	80321303	CONT	76/05/07	\$14,222
MONTANA STATE UNIV. BOZEMAN	EHE623 COOP. PROGRAM TO EVALUATE SURFACE & GROUND WATER PROBLEMS ASSOCIATED WITH POTENTIAL STRIP MINE SITES	WILLIAMS, T. T.	80372702	CONT	75/06/30	\$510,437
NORTHERN CHEYENNE TRIBAL COUNCIL LAME DEER	EHE623 POTENTIAL IMPACTS TO GROUND WATER & SURFACE-WATER QUALITY & QUANTITY FROM ENERGY DEVELOPMENT	MONTEAU, R.	80356602	CONT	76/06/11	\$201,756
** DEMONSTRATION ** MONTANA DEPT. OF HEALTH & ENVIR SCIENC HELENA	IDC058 MONTANA'S SOLID WASTE MANAGEMENT, ENERGY CONSERVATION & RESOURCE RECOVERY GRANT	JOHN S. ANDERSON, MD D	00911701	INCR	76/04/21	\$4,000
** TRAINING ** EMPLOYMENT SECURITY DIVISION HELENA	TO TRAIN 15 LEVEL & 3 PLANT OPERATORS NEED OF MT.	C. C. WARNER, DFP. ADM	00814201	NEW	76/05/24	\$6,895
MONTANA STATE DEPT OF HEALTH HELENA	2HK572 TRAINING CONFERENCE ON MICROBIOLOGICAL & CHEMICAL	A. C. KNIGHT, ACTING D	00914701	NEW	76/04/29	\$3,044
MONTANA STATE DEPT OF HEALTH & SCIE HELENA	ACTIVATED SLUDGE OPERATIONAL CONTROL WORKSHOP	ARTHUR C. KNIGHT, ACTI	00815501	NEW	75/06/21	\$5,000
** FELLOWSHIPS ** MONTANA, UNIV. OF MISSOULA	2BK159 M.S.	PLUCK, D. E.	91091901	NEW	75/06/01	\$6,500

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
N E B R A S K A						
** RESEARCH ** NEBRASKA, UNIV. OF LINCOLN	EHE625 USE OF POTASSIUM FERRATE IN OXYGEN DEMAND MEASUREMENT	CARR, JAMES D.	80393401	INCR	75/03/09	\$1,005
** TRAINING ** HASTINGS, CENTRAL TECH COMM COL AREA HASTINGS	2HK572 TRAINING OPPORTUNITIES THROUGH ONSITE EXPERIENCES FOR WATER/WASTEWATER PLANT OPERATORS	GAUSMAN, CHESTER H ARE	00707401	NEW	76/01/26	\$10,160
LEAGUE OF NEBR MUNICIPALITIES UTIL SEC LINCOLN	2HK572 ENVIRONMENTAL TRAINING SEMINAR	ARTMANN, WALTER G ASS	00708801	NEW	76/04/19	\$5,000
NEBRASKA DEPT ENVIRONMENTAL CONTROL LINCOLN	2BP159 DEVELOPMENT OF STATE TRAINING PLAN	OPAIN, DAN T DIRECTOR	00709401	NEW	76/06/16	\$5,000
NORTH PLATTE MID-PLAINS COMM COLLEGE NORTH PLATTE	2HK572 WASTE TREATMENT PLANT OPERATORS TRAINING PROGRAM	DOYLE, JAMES E VOC DEA	00707801	NEW	76/01/15	\$2,000
** FELLOWSHIPS ** NEBRASKA, UNIV. OF LINCOLN	2BK159 M.S./SAN. ENGR.	RUMPHAN, R. C.	91081001	NEW	76/03/29	\$4,209

APPLICANT	MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW HAMPSHIRE							
** DEMONSTRATION **	NEW HAMPSHIRE	PUBLIC HLTH DIV CONCERN	WAYNARD H NIKES MD	00111701	NEW	76/06/21	\$30,000

NEW HAMPSHIRE

** DEMONSTRATION **
 NEW HAMPSHIRE
 PUBLIC HLTH DIV
 CONCERN

WAYNARD H NIKES MD
 SOLID & HAZARDOUS WASTE PROG

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW JERSEY						
** RESEARCH **						
AMERICAN ELECTROPLATERS' SOCIETY, INC. EAST ORANGE	188610 DEV. OF HIGH-TEMP., OXIDATION-RESISTANT REVERSE OSMOSIS MEMBRANE FOR TREATM. OF METAL FLUSHING EFFL	LEAL, JOSEPH R.	80362001	INCR	76/04/30	\$23,750
AMERICAN ELECTROPLATERS' SOCIETY, INC. EAST ORANGE	188610 MEMBRANE PROCESSES FOR TREATING METAL FINISHING WASTES	SCHUMACHER, J. H.	80375301	INCR	75/01/12	\$25,000
			90375301	INCR	76/06/22	\$13,998
AMERICAN ELECTROPLATERS' SOCIETY, INC. EAST ORANGE	188610 EVALUATION OF NEW REVERSE OSMOSIS MEMBRANES FOR PLATING WASTE TREATMENT	SCHUMACHER, J. HOWARD	80431101	NEW	76/01/12	\$30,000
NEW JERSEY INST. OF TECH. NEWARK	188610 EVALUATE ABSORBANTS FOR REMOVAL OF CONTAMINANTS DURING DISPOSAL OF INDUSTRIAL SLUDGES	LISKOWITZ, JOHN	80371701	INCR	76/05/05	\$45,000
NEW JERSEY INST. OF TECH. NEWARK	188604 MODIFIED WET SCRUBBING OF IMMISCIBLES EMITTED FROM MANUFACTURE & PROCESSING OF ORGANIC PRODUCTS	CHEREMISINOFF, P. N.	80445501	NEW	76/04/12	\$55,000
RUTGERS UNIV. NEW BRUNSWICK	100614 THE SOURCES OF HALOGENATED MATERIALS IN AN URBANIZED WATER SUPPLY	HUNTER, JOSEPH V.	80439401	NEW	76/03/29	\$29,993
RUTGERS UNIV./COOK COLLEGE NEW BRUNSWICK	100618 STUDY OF VEGETATION PROBLEMS ASSOCIATED WITH REFUSE LANDFILLS	FLOWER, F. B.	80376202	CONT	76/05/21	\$44,515
** TRAINING **						
NEW JERSEY DEPT OF ENVPN. PROTECTION TRENTON	28P159 TRNG FOR OPERATING PERSONNEL	SIDNEY YTKIN, DIR	00213201	NEW	75/05/01	\$50,000
NEW JERSEY DEPT. OF ENVPN. PROTECTION TRENTON	28P159 SUMMER TRAINING IN WATER AND WASTEWATER	LIPPINCOTT, R. M.	90058601	NEW	76/05/14	\$3,200

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW JERSEY						
** TRAINING **						
NEW JERSEY ENVRN. COMM. ASSOC. MORRISTOWN	28K159 TRAINING COURSE FOR LOCAL OFFICIALS RELATIVE TO LOCAL GOVERNMENTAL ACTION	ASHMUN, CANDACE M.	90057701	NEW	75/05/01	\$40,000
NEWARK, CITY OF NEWARK	28P159 HIGH SCHOOL ENVIRONMENTAL INTERNSHIP	ZACH, A. L.	90057801	NEW	76/06/10	\$3,670

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW MEXICO						
** DEMONSTRATION ** NEW MEXICO STATE UNIV. LAS CRUCES	1HB617 DEMONSTRATION OF IRRIGATION RETURN FLOW SALINITY CONTROL IN THE UPPER RIO GRANDE	CLARK, JOHN W.	90356502	CONT	76/01/06	\$190,165
** TRAINING ** NEW MEXICO STATE UNIV. LAS CRUCES	2HW572 SEMINARS ON SAMPLING, ANALYSIS & MONITORING UNDER THE SAFE DRINKING WATER ACT	WILLIAM BARKLEY	00611901	INCR	76/05/24	\$1,620
NEW MEXICO STATE UNIV. LAS CRUCES	2BK159 TRAINING IN ENGINEERING ASPECTS OF WATER QUALITY	BARKLEY, WILLIAM A.	90019807	INCR	75/05/10	\$35,000
** FELLOWSHIPS ** NEW MEXICO STATE UNIV. LAS CRUCES	2BK159 M.S./CIVIL ENGR.	LYNCH, S. D.	91092701	NEW	76/05/05	\$6,500

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW YORK						
** RESEARCH **						
AGWAY INC. SYRACUSE	1BH617 COMPARISON OF FOUR DAIRY MANURE MANAGEMENT SYSTEMS	MARTIN, RODNEY D.	80434901	NEW	76/01/15	\$98,901
BOYCE THOMPSON INST. YONKERS	1AA502 RESPONSE OF PLANTS TO AIR POLLUTANTS	WEINSTEIN, L. M.	80451301	NEW	75/04/27	\$90,000
CENTER FOR POLICY RES., INC. NEW YORK	1BA607 EPIDEMIOLOGICAL STUDY OF HEALTH EFFECTS AMONG SWIMMERS AT NY RECREATION BEACHES	HABERMAN, PAUL M.	80325403	INCR	76/04/16	\$52,172
CORNELL UNIV. ITHACA	1AA602 EFFECTS OF SO2 AND NO2 ON THE SOIL ECOSYSTEM	ALEXANDER, M.	80359102	CONT	76/04/28	\$45,288
CORNELL UNIV. ITHACA	1BH617 LAND AS A WASTE MANAGEMENT ALTERNATIVE	CROWLEY, J. M.	80449501	NEW	75/04/09	\$9,000
INTERSTATE SAN. COMM. NEW YORK	1BC611 APPLICABILITY OF PRESSURE FILTRATION-PYROLYSIS OF SEWAGE SLUDGE IN A MULTIPLE HEARTH FURNACE	MYTELKA, ALAN I.	80446301	NEW	76/05/14	\$168,725
MANHATTAN COLLEGE BRONX	1BA608 MATHEMATICAL MODELS OF WATER QUALITY IN LARGE LAKES	LITORD, DOMINIC M.	80303003	CONT	75/03/29	\$115,148
MANHATTAN COLLEGE BRONX	1BA609 APPLICATION AND DEVELOPMENT OF EUTROPHICATION PLANNING MODELS FOR LAKE ONTARIO AND MICHIGAN	THOMANN, ROBERT V.	80368001	INCR	76/02/19	\$14,800
MANHATTAN COLLEGE BRONX	1RA609 APPLICATION AND DEVELOPMENT OF EUTROPHICATION PLANNING MODELS FOR LAKE ONTARIO	THOMANN, R. V.	80368002	CONT	75/03/09	\$127,386
MANHATTAN COLLEGE BRONX	1FA615 MATHEMATICAL MODELS OF FATES OF POLLUTANTS IN ESTUARIES	O'CONNOR, D. J.	80456301	NEW	76/06/18	\$130,681

APPLICANT MUNICIPALITY

PROGRAM ELEMENT TITLE

PROJECT DIRECTOR / FELLOW

GRANT NO

TYPE OF GRANT

DATE OF AWARD

AMOUNT OF GRANT AWARDED

NEW YORK

** RESEARCH **

NATIONAL COUNCIL OF PAPER IND. FOR AIR
NEW YORK

LAB604 BLOSSER, R. O.
DETERMINATION OF SO₂ EMISSION LEVELS IN
KRAFT PULPING LIQUOR RECOVERY FURNACES
NEW 76/06/11 \$24,350

NATIONAL COUNCIL OF PAPER IND. FOR AIR
NEW YORK

LAB604 BLOSSER, R. O.
CHEMICAL CHARACTERIZATION DETERMINATION
RELATIVE EFFLUENT ODOOR CONTRIBUTION SELECTED PROCESS STREAMS
NEW 75/05/25 \$31,300

NEW YORK STATE UNIV. RES. FDN.
ALBANY

LAB605 SWEENEY, ROBERT A.
LAKE ERIE NUTRIENT CONTROL PROGRAM AN
ASSESSM. OF CONTROLLING EUTROPHICATION-EASTERN BASIN
INCR 76/05/21 \$42,000

NEW YORK STATE UNIV. RES. FDN.
ALBANY

LAB605 MCNAUGHT, D. C.
IMPACT OF ZOOPLANKTON GRAZING UPON PHYTOPLANKTON
IN EUTROPHIC SAGINAW BAY & WESTERN LAKE ERIE
NEW 76/05/20 \$74,000

NEW YORK UNIV.
NEW YORK

EWE624 BRENNER, M.
NOVEL POSTTREATMENTS FOR WASTE CELLULOSE
HYDROLYSIS FOR UTILIZATION CELLULOSE VALUES FROM SOLID WASTES
INCR 76/05/24 \$60,237

NEW YORK UNIV. OF
NEW YORK

LAB605 AHMED, SAMIR
REMOTE MONITORING OF AIR POLLUTION PRODUCED
BY STATIONARY SOURCES, AREA SOURCES
CONT 76/05/07 \$6,000

ROCHESTER, UNIV. OF
ROCHESTER

LAB605 DANEKFF, B. E.
MEASUREMENT OF AIRBORNE PARTICULATES
CONT 75/05/18 \$10,000

SLOAN-KETTERING INST. FOR CANCER RES.
NY

LAB601 ANDERSON, R.
BIOCONCENTRATION ENVYR.CARCINOGENS:RESPONSE
MARINE INVERTEBRATE MICROSOXIAL OXIDASES ENVYR.CARCINOGEN
NEW 76/05/21 \$28,176

SYRACUSE UNIV.
SYRACUSE

198610 JENNETT, J. CHARLES
EVALUATION OF ANAEROBIC FILTER AS A DEVICE
FOR TREATING PHARMACEUTICAL WASTES
NEW 76/04/26 \$25,000

** DEMONSTRATION **

NEW YORK ST. DEPT. OF ENVYR. CONSERV.
ALBANY

28H412 METLING, LEO J.
HAMPTON MANOR LAKE RESTORATION
NEW 75/04/03 \$50,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW YORK STATE DEPT. OF ENVIRON. CONSERV. ALBANY	28M412 WASHINGTON PARK LAKE RESTORATION	HETLING, LEO J.	80425201	NEW	76/04/09	\$23,250
NEW YORK STATE DEPT. ENVIRON. CONSERV. ALBANY	28M412 COLLINS PARK LAKE RESTORATION	HETLING, LEO J.	90425001	NEW	76/01/08	\$46,250
NEW YORK STATE DEPT. OF ENVIRON. CONSERV. ALBANY	28M412 BUCKINGHAM LAKE RESTORATION	HETLING, LEO J.	90425301	NEW	76/04/09	\$23,250
NEW YORK STATE DEPT. OF ENVIRON. CONSERV. ALBANY	28M412 DELAWARE PARK LAKE RESTORATION PROJECT	HETLING, LEO J.	90425401	NEW	76/02/17	\$141,300
NEW YORK CITY OF NEW YORK	28M237 IMPROVED SOLID WASTE COLLECTION EQUIPMENT FOR NEW YORK CITY	STICKSTEIN, P.	90469401	NEW	76/05/24	\$30,000
MONROE CNTY. DEPT. PUBLIC WORKS SYRACUSE	18C611 DISINFECTION/TREATMENT OF COMBINED SEWER OVERFLOWS	HENNINGAN, JOHN J.	80240301	INCR	76/04/09	\$90,000
CORNELL UNIV. ITHACA	28K159 WATER QUALITY CONTROL ENGINEERING	GATES, CHARLES D.	90012708	INCR	76/06/07	\$30,000
CORNELL UNIV. ITHACA	28K159 DEVELOPMENT OF COURSES IN LAND DISPOSAL OF WASTES	LOHR, RAYMOND C.	90012709	INCR	76/02/10	\$25,000
ENVIRONMENTAL ACTION COALITION INC. NEW YORK	28M237 EDUCATION & ACTION PROGRAM IN SOLID WASTES, RECYCLING & RESOURCE RECOVERY	POPP, W. A.	90058101	NEW	76/05/26	\$52,300

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW YORK						
•• TRAINING •• MANHATTAN COLLEGE BRONX	2BK139 TRAINING PROFESSIONAL SPECIALISTS IN WATER POLLUTION CONTROL	JERIS, JOHN S.	90013507	INCR	75/06/10	\$17,600
SCIENTISTS' COMM. FOR PUBLIC INFO. NEW YORK	2DH297 HAZARDOUS WASTE CONFERENCE	UDOSKIN, JUDITH	90061001	NEW	76/06/25	\$10,000
ULSTER CNTY. COMMUN. COLLEGE STONE RIDGE	2BK139 PROGRAM FOR INSTRUCTIONAL MATERIAL, EVALUATION & CURRICULUM DEVELOPMENT IN WATER POLLUTION MONITORING	GALZER, RICHARD B.	90050802	INCR	76/06/11	\$14,385
•• FELLOWSHIPS •• COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	ABRAMOWITZ, MICHAEL M.	91073901	NEW	76/01/15	\$1,620
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	JUARBE, LUIS	91073901	NEW	75/01/15	\$1,520
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	YEE, FRANK G.	91073901	INCR	76/06/11	\$1,367
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	VYAS, SAROJ V.	91074001	INCR	75/05/19	\$1,357
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.		91074301	NEW	76/01/15	\$1,620

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW YORK						
** FELLOWSHIPS **						
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	TRUCKMAN, PAUL R.	91074301	INCR	76/06/11	\$1,967
			91074401	NEW	76/01/15	\$1,620
			91074401	INCR	76/06/18	\$1,967
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	YANG, WILLIAM	91074501	NEW	76/01/15	\$1,520
			91074501	INCR	76/06/11	\$1,967
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	YAN, DEWARD T.	91074601	NEW	76/01/15	\$1,620
			91074501	INCR	76/06/11	\$1,967
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	STADNYCKI, RICHARD J.	91074801	NEW	76/01/15	\$1,620
			91074801	INCR	76/06/11	\$1,967
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	SILVERBERG, IRA S.	91074901	NEW	76/01/15	\$1,620

APPLICANT MUNICIPALITY PROGRAM ELEMENT TYPE PROJECT DIRECTOR / FELLOW GRANT NO TYPE OF GRANT DATE OF AWARD AMOUNT OF GRANT AWARD

NEW YORK

•• FELLOWSHIPS ••

COOPER UNION
NEW YORK

2AK139
M.S./ENVRN. ENGR.

SIEBENBERG, STANLEY

91075001

NFW

76/01/15

\$1,620

COOPER UNION
NEW YORK

2AK139
M.S./ENVRN. ENGR.

RAST, CHARLES C.

91075201

NFW

76/01/26

\$1,620

COOPER UNION
NEW YORK

2AK139
M.S./ENVRN. ENGR.

SEBELWITZ, ARTHUR

91075301

NFW

76/01/22

\$1,620

COOPER UNION
NEW YORK

2AK139
M.S./ENVRN. ENGR.

BRADY, BRAD E.

91075401

NFW

76/01/26

\$1,620

COOPER UNION
NEW YORK

2AK139
M.S./ENVRN. SCIENCES

FRISBERG, NORMAN R.

91075501

NFW

76/01/26

\$1,620

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT GRANT AWARD
NEW YORK						
** FELLOWSHIPS **						
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	GOLDBERGER, LASLO	91075501	INCR	76/06/11	\$1,967
			91075601	NEW	76/01/26	\$1,620
			91075601	INCR	76/06/25	\$1,967
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR./PLANNING MGMT.	GOLDSMITH, ELLIOT R.	91075701	NEW	76/01/22	\$1,620
			91075701	INCR	76/06/25	\$1,967
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	HALPERN, MARK	91075801	NEW	76/01/22	\$1,620
			91075801	INCR	76/06/18	\$1,967
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	VIRENDRA, JAIN	91075901	NEW	76/01/26	\$1,620
			91075901	INCR	76/06/22	\$1,967
COOPER UNION NEW YORK	2AK139 M.S./PLANNING & MGMT.	KAMINS, MARTIN B.	91076001	NEW	76/01/26	\$1,620

APPLICANT	MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
COOPER UNION NEW YORK	NEW YORK	2AK137 M.S./ENVEN. ENGR.	LARGES, JOEL B.	91076101	NFW	76/01/26	\$1,620
COOPER UNION NEW YORK	NEW YORK	2AK139 M.S./ENVEN. ENGR.	LIEBERSTEIN, MELVIN	91076101	INCR	76/06/22	\$1,967
COOPER UNION NEW YORK	NEW YORK	2AK137 M.S./ENVEN. ENGR.	LICHTMAN, JOSEPH Z.	91076301	NFW	75/01/26	\$1,520
COOPER UNION NEW YORK	NEW YORK	2AK139 M.S./ENVEN. ENGR.		91076201	INCR	76/06/11	\$1,967
COOPER UNION NEW YORK	NEW YORK	2AK137 M.S./ENVEN. ENGR.		91076301	INCR	75/06/25	\$1,967
COOPER UNION NEW YORK	NEW YORK	2AK139 M.S./ENVEN. ENGR.	MARSH, VERA A. PLANNING & MGMT.	91076401	NFW	76/01/26	\$1,620
COOPER UNION NEW YORK	NEW YORK	2AK137 M.S./ENVEN. ENGR.		91076401	INCR	76/06/22	\$1,967
COOPER UNION NEW YORK	NEW YORK	2AK137 M.S./ENVEN. ENGR.		91076501	NFW	75/01/25	\$1,620
COOPER UNION NEW YORK	NEW YORK	2AK139 M.S./ENVEN. ENGR.		91076501	INCR	76/06/11	\$1,967

APPLICANT	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MUNICIPALITY						
NEW YORK						
** FELLOWSHIPS **						
CORPUS UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	PAULI, PAUL	91076601	NEW	76/01/22	\$1,620
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	ROTH, PAUL M.	91076701	NEW	76/01/26	\$1,620
COOPER UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	REICH, E.	91077501	NEW	76/03/29	\$1,620
			91077501	INCR	76/06/19	\$1,967
COOPER UNION NEW YORK	2AK139 M.S./ENVIRONMENTAL SCIENCES	PAMRING, O. M.	91078001	NEW	76/04/01	\$1,520
			91079001	INCR	76/06/18	\$1,967
CORPUS UNION NEW YORK	2AK139 M.S./ENVRN. ENGR.	CORLEY, W.	91090701	NEW	76/03/29	\$1,620
CORNELL UNIV. ITHACA	2AK139 M.S./REGIONAL PLANNING	SAHIS, R. A.	91095901	NEW	75/05/25	\$7,106
CORNELL UNIV. LAW SCH. ITHACA	2BK159 M.P.A./J.D./BUSINESS ADMIN./PUBLIC LAW	SPITZER, S. L.	91079501	NEW	76/05/26	\$6,200
MANHATTAN COLLEGE BRONX	2BK159 M.S./ENVRN. ENGR.	GIUNTA, JOSEPH J.	91085501	NEW	76/04/25	\$3,360

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW YORK						
•• FELLOWSHIPS ••						
MANHATTAN COLLEGE BRONX	2BK159 M.S./ENVRN. SCIENCE	AUFRECHT, P. G.	91091401	NEW	76/06/01	\$4,570
NEW YORK POLYTECHNIC INST. BROOKLYN	2BK139 M.S./CIVIL ENGR.	CAPP, P. J.	91093001	NEW	76/06/16	\$1,524
NEW YORK POLYTECHNIC INST. BROOKLYN	2BK159 M.S./SCIENCE	MADOFF, C. I.	91099701	NEW	76/06/01	\$1,850
NEW YORK POLYTECHNIC INST. BROOKLYN	2BK159 PH.D./ENVRN. HEALTH SCIENCE	BABSKI, GERALD J.	91094701	NEW	75/05/03	\$5,374
NEW YORK STATE UNIV./EMPIRE COLLEGE SYRACUSE	2BK159 B.S./ENVRN. SCIENCE	NIETSCH, R. E.	91094401	NEW	76/04/13	\$2,991
NEW YORK UNIV. OF BUFFALO	2BK159 PH.D.	CRAIG, EDWARD W.	91083501	NEW	76/05/21	\$5,500
NEW YORK UNIV. OF ALBANY	2BK159 M.S.	ADAMCZYK, A. F.	91095401	NEW	76/06/11	\$900
RENSSELAER POLYTECHNIC INST. TROV	2BK139 M.S./URBAN & ENVRN. STUDIES	HUDSON, C. M.	91091301	NEW	76/06/03	\$1,501
RENSSELAER POLYTECHNIC INST. TROV	2BK139 M.S.	MCMAHON, J. M.	91093101	NEW	75/05/10	\$5,500
RENSSELAER POLYTECHNIC INST. TROV	2BK159 M.S./CHEMICAL ENGR.	BURKE, M. F.	91090901	NEW	76/05/05	\$4,960

APPLICANT	MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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NEW YORK

•• FELLOWSHIPS ••

RENSSELAER POLYTECHNIC INST.
TROV

24K139 STAMARZ, M. A.
M.S./URBAN ENVRN. STUDIES

91033301 NEW 76/06/10 \$8,625

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
N O R T H C A R O L I N A						
** RESEARCH ** AMERICAN TEXTILE MANUFACTURERS INST. CHARLOTTE	188610 TECHNICAL & ECONOMIC EVALUATIONS OF BATEA GUIDELINES-TEXTILES	NILES, O'JAY	80432901	NEW	76/01/26	\$157,000
			80432901	INCR	75/05/21	\$45,000
DUKE UNIV. DURHAM	EME625 DEVELOPMENT OF A TWO STAGE PARTICLE FRACTIONATOR BY FILTRATION THROUGH NUCLEOPORE SURFACES	BUZZARD, G. H.	80301903	CONT	76/03/02	\$11,720
FELDSPAR CORP. SPRUCE PINE	189610 REMOVAL OF FLUORIDES FROM INDUSTRIAL WASTE WATERS USING ACTIVATED ALUMINA	BARBER, RICHARD L.	80437701	NEW	75/04/14	\$45,000
NORTH CAROLINA STATE UNIV. RALFIGH	140605 MATHEMATICAL TECHNIQUES FOR X RAY ANALYZERS	GARDNER, R. P.	80275903	CONT	76/04/29	\$20,000
NORTH CAROLINA STATE UNIV. RALFIGH	188610 CHARACTERIZATION & DISPOSAL OF CLAY SLIMES FROM SAND & GRAVEL MINING OPERATIONS	MALCOLM, H. R.	80390802	CONT	76/06/16	\$59,142
NORTH CAROLINA STATE UNIV. RALEIGH	1AA603 ANALYSIS OF TOWER MEASUREMENTS OF TURBULENCE FOR NONUNIFORM FETCHES	WEBER, ALLEN H.	80427801	NEW	76/03/17	\$15,000
NORTH CAROLINA STATE UNIV. RALEIGH	14B617 MECHANISM & CONTROL OF RAINFALL IMPACT FROM LAND APPLICATION SITES	WESTERMAN, P. W.	80460801	NEW	75/05/11	\$52,172
NORTH CAROLINA, UNIV. OF CHAPEL HILL	1AA603 OUTDOOR SIMULATION OF AIR POLLUTION CONTROL STRATEGIES	JEFFRIES, HARVEY E.	80091604	CONT	76/01/20	\$105,000
			80091604	INCR	75/04/27	\$13,592

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NORTH CAROLINA						
** RESEARCH **						
NORTH CAROLINA, UNIV. OF CHAPEL HILL	1A4503 EXPERIMENTAL STUDY OF AEROSOL FORMATION MECHANISMS IN A CONTROLLED ATMOSPHERE	PEIST, PARKER	80091604	INCR	76/06/03	\$17,700
NORTH CAROLINA, UNIV. OF RALFIGH	1H8617 POLLUTION FROM RURAL LAND RUNOFF	HUMENIK, F. J.	80332903	CONT	76/06/30	\$225,000
NORTH CAROLINA, UNIV. OF CHAPEL HILL	2A4137 POPULATION EXPOSURE AS AN AIR QUALITY INDICATOR	STERN, ARTHUR	80346101	INCR	76/02/09	\$4,946
NORTH CAROLINA, UNIV. OF CHAPEL HILL	1A4601 SYMPOSIUM ON NEUROBEHAVIORAL INDICES OF ENVIRONMENTAL INSULT	LIPTON, MORRIS A.	80349402	CONT	76/01/22	\$19,119
NORTH CAROLINA, UNIV. OF CHAPEL HILL	1A4601 PATHOPHYSIOLOGY OF CO EXPOSURE IN ISCHEMIC HEART DISEASE	MCLAURIN, L. P.	80431601	NEW	76/04/09	\$197,702
NORTH CAROLINA, UNIV. OF CHAPEL HILL	19D612 DEVELOPMENT OF AN ON-LINE INFRARED SPECTRAL SEARCH SYS. UTILIZING PATTERN RECOGNITION & INFORMATION	ISENHOUR, THOMAS L.	80439101	NEW	76/02/23	\$58,057
NORTH CAROLINA, UNIV. OF CHAPEL HILL	1CC614 CHLORINATION OF AQUATIC HUMIC SUBSTANCES	CHRISTMAN, R. F.	80443001	NEW	76/05/27	\$119,204
** TRAINING **						
NORTH CAROLINA DEPT. NAT. & ECON. RES. PALEIGH	28P158 STATE & LOCAL MANPOWER DEVELOPMENT GRANT STATE & LOCAL MANPOWER DEVELOPMENT GRANT	KNIGHT, J.E.	00417901	NEW	76/03/15	\$12,000
NORTH CAROLINA, UNIV. OF CHAPEL HILL	2AK139 GRADUATE TRAINING IN AIR POLLUTION	STERN, ARTHUR C.	90005305	INCR	76/05/11	\$41,223

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
N O R T H C A R O L I N A						
** TRAINING ** NORTH CAROLINA, UNIV. OF CHAPEL HILL	2BK159 GRADUATE TRAINING WATER QUALITY ASSESSMENT	WEISS, CHARLES M.	90012208	INCR	76/06/14	\$39,000
** FELLOWSHIPS ** NORTH CAROLINA STATE UNIV. PALFISH	2BK159 M.S./CIVIL ENGR.	LEWIS, F. T.	91084501	NEW	76/04/16	\$6,500
NORTH CAROLINA, UNIV. OF CHAPEL HILL	2BK159 M.S./CITY & REGIONAL PLANNING	HOWARDS, S. A.	91096101	NEW	76/06/01	\$5,058

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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N O R T H D A K O T A

** RESEARCH **

NORTH DAKOTA STATE DEPT OF HEALTH
PISMARCK

ASSIST NORTH DAKOTA WITH GATHERING BASELINE
AIR QUALITY DATA

GENE CHRISTIANSON, DIR
00812701 NEW 76/02/17 \$49,100

APPLICANT	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MUNICIPALITY						
OHIO RESEARCH **						
BAYTLE MEMORIAL INST. COLUMBUS	EH524 ENVIRONMENTAL EFFECTS OF UTILIZING SOLID WASTE AS A SUPPLEMENTARY POWER PLANT FUEL	VAUGHAN, DALE A.	90400802	INCR	75/05/11	\$193,030
CASE WESTERN RESERVE UNIV. CLEVELAND	19409 DISPERSION AND FATE OF HAZARDOUS MATERIALS IN LARGE LAKES	LICK, W.	9030402	CONT	76/05/21	\$168,795
CHILDREN'S HOSPITAL COLUMBUS	100514 A LONGITUDINAL EVALUATION OF LEAD BODY BURDEN IN GROWING CHILDREN	LUBEN, A. HAROLD	90415801	NEW	76/04/14	\$107,613
CINCINNATI, UNIV. OF CINCINNATI	100614 HEALTH RISKS OF HUMAN EXPOSURE TO WASTEWATER	CLARK, C. S.	80344302	CONT	76/03/19	\$274,326
CINCINNATI, UNIV. OF CINCINNATI	100614 EFFECT OF PARTICULATES ON DISINFECTION OF ENTEROVIRUSES IN WATER BY CHLORINE DIOXIDE	SCARPINO, PASQUALE V.	90441901	NEW	76/03/12	\$69,764
MAHONING CNTY. BD. OF COMM. YOUNGSTOWN	180611 EVALUATION OF OZONATION SYSTEM FOR WASTEWATER DISINFECTION	FITAS, MICHAEL	80446001	NEW	75/05/14	\$94,551
NATIONAL WATER WELL ASSOC. WORTHINGTON	100614 CONSTRUCTION GUIDE OF SUBSURFACE INJECTION SYSTEM AND ABANDONMENT PROCEDURES	LEHR, J. W.	90388901	INCR	76/05/03	\$50,720
OHIO AGRI. RES. & DEVELOPMENT CTR. WOOSTER	148617 COST-EFFECTIVE LIVESTOCK MANAGEMENT SYSTEMS TO CONTROL POLLUTION	WHITE, RICHARD K.	90454801	NEW	75/05/03	\$59,535
OHIO STATE UNIV RES. FON. COLUMBUS	148617 PROPAGATION OF INSECT VIRUSES IN CULTURED INSECT CELLS	HINK, W. F.	90251604	CONT	76/05/12	\$48,692

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
OHIO STATE UNIV. COLUMBUS	IRAG09 LAKE EPIE NUTRIENT CONTROL PROGRAM: ASSESSMENT OF ITS EFFECTIVENESS IN CONTROLLING EUTROPHICATION	HERDENDORF, CHARLES E.	90254303	INCR	76/03/17	\$67,614
OHIO STATE UNIV. COLUMBUS	ICC614 EFFECTS OF SIZED ASBESTOS FIBERS ON CELLULAR DNA, MEMBRANE STRUCTURE-FUNCTION	HART, DONALD W.	80420101	NEW	76/03/17	\$95,328
OHIO STATE UNIV. COLUMBUS	EHE625 LIMNOLOGICAL INVESTIGATIONS OF WATER QUALITY & FISH LARVAE IN LAKE ERIE	HERDENDORF, C. E.	80461201	NEW	76/05/21	\$138,428
OHIO STATE UNIV. RES. FDN. COLUMBUS	EHE525 A KINETIC STUDY OF SIMULATED SO2, NOX, RH-POLLUTED ATMOSPHERES	CALVERT, JACK G.	80434901	NEW	76/01/22	\$95,000
OHIO UNIV. ATHENS	IRD612 AUTOMATED MEASUREMENTS OF THE INFRARED SPECTRA OF CHROMATOGRAPHICALLY SEPARATED MATERIALS	GRIFFITHS, PETER	80433301	NEW	76/02/19	\$29,131
** DEMONSTRATION **						
CHAMPION INTERNATIONAL HAMILTON	188610 COLOR REMOVAL FROM KRAFT DECKER & BLEACH EFFLUENTS BY ULTRAFILTRATION	FREMONT, HENRY A.	90431201	NEW	75/02/09	\$140,000
** TRAINING **						
CINCINNATI, UNIV. OF CINCINNATI	28K159 GRADUATE TRAINING IN WATER POLLUTION CONTROL	EYE, J. DAVID	90012305	INCR	76/06/15	\$16,000
CINCINNATI, UNIV. OF CINCINNATI	2AK139 AIR POLLUTION	SALTZMAN, B. E.	90022903	INCR	76/05/27	\$282
INSTITUTE OF ENVIRON. EDUC. CLEVELAND	2RK159 GRADUATE SUMMER & INSERVICE TRAINING-STATE-WIDE WATER QUALITY DATA DEVELOPMENT SYSTEMS	OFFUTT, T. W.	90053202	CCNT	76/05/01	\$20,974

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APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** TRAINING ** TOLEDO, UNIV. OF TOLEDO	28K159 WATER POLLUTION CONTROL TRAINING GRANT	BENNETT, GARY F.	90013208	INCR	76/06/16	\$12,900
** FELLOWSHIPS ** CASE WESTERN RESERVE UNIV. CLEVELAND	2AK139 M.S./CHEMISTRY	JURASEK, M. F.	9109901	NEW	76/05/25	\$8,055
OHIO STATE UNIV. COLUMBUS	28K159 M.S./ENVRN. ENGR. & PUBLIC ADMINISTRATION	CARITY, SHELTON M.	9107601	NEW	76/02/09	\$6,500

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APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
O K L A H O M A						
** RESEARCH **						
OKLAHOMA STATE DEPT. OF HEALTH OKLAHOMA CITY	19C611 SPRAY RUNOFF/TREATMENT OF MUNICIPAL WASTEWATER	KEENE, FORREST M.	90321901	INCR	76/06/07	\$65,822
OKLAHOMA STATE UNIV. STILLWATER	1A0605 SYNTHESIS AND PURIFICATION OF HIGH PURITY AROMATIC COMPOUNDS	FISENBAUM, E. J.	80309703	CONT	76/04/26	\$40,000
OKLAHOMA, UNIV. OF NORMAN	1A0603 DEVELOPMENT OF VARIATIONAL FORMALISM TO ANALYZE MEAN TRACER CONCENTRATIONS	INMAN, REX L.	80450701	NEW	76/05/27	\$10,186
** TRAINING **						
OKLAHOMA STATE UNIV. STILLWATER	28K159 TRAINING IN WATER POLLUTION CONTROL (ENGINEERING SCIENCE; INTERDISCIPLINARY)	GAUDY, ANTHONY F.	90007806	INCR	76/06/25	\$17,000
** FELLOWSHIPS **						
OKLAHOMA STATE UNIV. STILLWATER	28K139 M.S./BIO-ENVRN. ENGR.	SOBER, R. F.	91085601	NEW	76/05/26	\$7,585
OKLAHOMA, UNIV. OF NORMAN	28K159 M.S./ENGR.	FROSTENSON, J. C.	91092901	NEW	76/05/26	\$5,450
OKLAHOMA, UNIV. OF NORMAN	28K159 B.S./CIVIL ENGR.	AMOS, S.	91095601	NEW	76/06/10	\$6,500

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
OREGON STATE UNIV. CORVALLIS	19A609 EVALUATE EFFECTS OF CHRONIC EXPOSURE OF FISHES TO ENVIRONMENTAL CONTAMINANTS	WEBER, LAVERN	90309002	CONT	76/03/11	\$19,951
OREGON STATE UNIV. CORVALLIS	19B517 COMPREHENSIVE FEEBLY POLLUTION CONTROL DESIGN MODEL	MINER, J. R.	80381902	CONT	75/04/29	\$34,099
OREGON STATE UNIV. CORVALLIS	1CC614 EFFECTS OF ENVIRONMENTAL CONTAMINANTS ON CELL-MEDIATED IMMUNITY	KOLLER, LOREN D.	80420001	INCR	76/02/17	\$1,374
OREGON STATE UNIV. CORVALLIS	EH623 EFFECTS OF COMPOUNDS PROD. FROM PETROLEUM UTILIZATION FOR SELECTED INVERTEBRATES - CARCINOGENESIS	MIX, MICHAEL C.	80442701	NFM	76/03/09	\$60,440
OREGON STATE UNIV. CORVALLIS	1CC614 ORIGIN, VIRULENCE, GROWTH, & CONTROL OF COLIFORMS IN DRINKING WATER EMANATING FROM WOODEN TANKS	SEIDLER, RAMON J.	80445601	NFM	76/06/14	\$24,494
** DEMONSTRATION **						
BEND, CITY OF BEND	19C611 RESEARCH & DEMONSTRATION PROJECT ON VACUUM & PRESSURE SEWERS	JOHNSON, ARTHUR R.	80329501	INCR	75/03/12	\$25,000
** TRAINING **						
LINN-BENTON COMMUNITY COLLEGE ALBANY	29K572 WATER POLLUTION CONTROL OPERATION TRAINING GRANT	VERNON E. FORNELL	00J10701	NEW	75/03/29	\$20,200
OREGON MUSEUM OF SCIENCE & INDUSTRY PORTLAND	29K159 OREGON STATEWIDE WATER QUALITY EVALUATION PROJECT	CRAIG, LINDA S.	90053102	CONT	76/06/10	\$21,330
OREGON STATE UNIV. CORVALLIS	29K159 GRADUATE TRAINING IN WATER QUALITY	SCHUMBERG, FRANK D.	900J7209	INCR	75/05/07	\$19,900

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** FELLOWSHIPS **
 PORTLAND STATE UNIV.
 PORTLAND

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 M.S./ENGR.

CHER, J. D.

91081901

NEW

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APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
P E N N S Y L V A N I A						
** RESEARCH **						
AMERICAN SOCIETY FOR TESTING & MATERIALS PHILADELPHIA	IM0521 CONFERENCE ON INTERNATIONAL AIR QUALITY MEASUREMENTS	LEVADIE, R.T.	90359302	CONT	75/02/12	\$5,000
CARNEGIE-MELLON UNIV. PITTSBURGH	EME024 ELECTROSTATIC EFFECTS IN FABRIC FILTRATION	PERNEY, G. W.	90302003	CONT	76/05/12	\$86,150
DRACO CORP. PITTSBURGH	1B0610 APPLICATION OF FLUE GAS DESULFURIZATION SLUDGES IN COMB. WITH MUN. SLUDGES TO PRODUCE FERTILE SOILS	FREAS, R. C.	80399901	NEW	75/03/09	\$74,912
DEXEL UNIV. PHILADELPHIA	1B0610 SPILL ALERT DEVICE FOR IMPROVED HAZARDOUS MATERIALS	KOENER, ROBERT M.	80251103	INCR	76/06/09	\$25,000
FRANKLIN INST. RES. LAB. PHILADELPHIA	IME519 PREPARATION OF THE MUNICIPAL TECH. BULLETIN & INPUT TO THE MUSIC DATA SERVICE	MURPHY, JOANNE S.	90351301	INCR	75/05/03	\$22,680
PENNSYLVANIA MEDICAL COLLEGE PHILADELPHIA	1A0601 STUDIES ON THE EFFECTS OF ATMOSPHERIC POLLUTANTS ON CARCINOGENESIS	LEIGHTON, J.	90293903	CONT	76/02/19	\$50,000
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	1A0603 SELECT RESEARCH GROUP IN AIR POLLUTION METEOROLOGY	THOMPSON, DENNIS M.	90039704	INCR	76/03/29	\$7,500
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	1A0605 DESIGN OF STACK SAMPLING SYSTEM WITH DILUTION	HEINSMAN, R.	90356002	CONT	76/03/30	\$50,000
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	1A0605 CHEMICAL IONIZATION MASS SPECTROMETRY OF ORGANICS & ORGANOMETALLIC COMPOUNDS	RISBY, TERENCE	90355102	CONT	75/05/01	\$30,000
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	EME023 MANUAL OF PRACTICE FOR PREMINING PLANNING FASTENED SURFACE COAL MINING	RAMANI, R. V.	90399202	CONT	76/06/30	\$152,359

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
P E N N S Y L V A N I A						
** RESEARCH **						
PENNSYLVANIA STATE UNIV. HERSHEY	ICC614 HALOGENATED HYDROCARBON TOXICITY IN MICE	HILL, RICHARD N.	80441901	NEW	76/04/13	\$61,097
PHILADELPHIA ACADEMY NATURAL SCIENCES PHILADELPHIA	19A509 EFFECT OF NITRILOTRIACETIC ACID & MICRONUTRIENTS ON STRUCTURE & FUNCTION OF AQUATIC STREAM COMMUNITIES	PATRICK, RUTH	80195103	CONT	76/03/08	\$154,428
ST. VINCENT COLLEGE LATROBE	1AA601 DETERMINATION OF NO-EFFECT LEVEL OF IMMEDIATE & DELAYED ALLERGIC RESPONSE TO PLATINUM-GROUP METALS	TAUBLER, JAMES H.	80303602	INCR	76/04/09	\$39,712
SUSQUEHANNA UNIV. SELINGROVE	ICC514 RECOVERY STUDIES OF PESTICIDES FROM SURFACE WATER	MCGRATH, THOMAS F.	80429401	NEW	76/04/29	\$19,834
THOMAS JEFFERSON UNIV. PHILADELPHIA	1FA615 ORGANOPHOSPHATE INSECTICIDES ON BENZO(A)PYRENE CARCINOGENESIS	TRICLO, ANTHONY J.	80348602	CONT	76/01/08	\$35,000
** TRAINING **						
AMERICAN LAW INST. PHILADELPHIA	38W126 SUPPORT OF ENVIRN. LAWYERS & LAW STUDENTS TO ATTEND CONFERENCE ON ENVIRN. LAW	MACLAY, DONALD M.	90057201	NEW	76/02/19	\$20,000
PA. DEPT. OF COMMUNITY AFFAIRS HARRISBURG	28P159 WATER POLLUTION CONTROL TRAINING	ZIGMENT, ANTHONY JR.	00310802	CONT	76/06/18	\$30,000
PHILADELPHIA, CITY OF PHILADELPHIA	20M297 TRAINING PROGRAM FOR OPERATING SUPERVISORS IN THE USE OF SANITATION MGMT. INFORMATION SYSTEM	KASIMETZ, S.	90059601	NEW	76/05/24	\$25,000
** FELLOWSHIPS **						
DREXEL UNIV. PHILADELPHIA	2AK139 ENVIRN. SCI. AIR RES.	KAHN, R. T.	91077301	NEW	76/05/25	\$11,100

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P E N N S Y L V A N I A						
** FELLOWSHIPS **						
DEFFEL UNIV. PHILADELPHIA	28K159 M.S.	LUBOW, S. P.	91021501	NEW	76/05/05	\$5,500
DUQUESNE UNIV. PITTSBURGH	2AK139 M.S.	GUNNER, D.	91079901	NEW	76/05/26	\$1,684
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	2AK139 M.S./ENVIRON. POLLUTION CONTROL	SMITHWICK, J. O.	91085701	NEW	76/06/09	\$9,910
PITTSBURGH, UNIV. OF PITTSBURGH	2AK139 M.S./HYGIENE	WAGO, HENRY C.	91057001	INCR	76/06/11	\$441

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
R H O D E I S L A N D						
** RESEARCH **						
RHODE ISLAND, UNIV. OF KINGSTON	19A608 INFLUENCE OF DREDGE SPILLS AND SEDIMENT POLLUTION ON TRACE METAL ASSIMILATION BY ORGANISMS	BENDER, M. L.	80324303	CONT	75/04/14	\$50,741
RHODE ISLAND, UNIV. OF KINGSTON	19A607 PREPARATION OF FLUORESCENT CITRATE & SUICIDE ANALOGS	ROSEN, WILLIAM M.	80372801	INCR	76/05/24	\$14,000
RHODE ISLAND, UNIV. OF KINGSTON	18A608 CAGED BACTERIAL CULTURE AS A POLLUTION MONITORING SYSTEM	SIEBURTH, JOHN MCN.	90421701	NEW	75/03/29	\$40,000
** DEMONSTRATION **						
RHODE ISLAND, STATE OF PROVIDENCE	10B058 SOLID WASTE DEMO GRANT	DR. JOSEPH E. CANNON	00110701	NEW	76/06/11	\$47,000
** FELLOWSHIPS **						
BROWN UNIV. PROVIDENCE	28K139 COMPUTER SCIENCE/STATISTICS	NOLAN, JAMES	91050701	INCR	76/05/27	\$8,708
RHODE ISLAND, UNIV. OF KINGSTON	28K159 M.S.	DOLCE, T. J.	91092301	NEW	76/05/26	\$1,660

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
S O U T H C A R O L I N A						
** RESEARCH **						
CLAFIN COLLEGE ORANGEBURG	186522 ARSENIC DETERMINATION BY SILVER DIETHYLDITHIOCARBAMATE METHOD - ELIMINATION OF METAL ION INTERFERENCE	SANDHU, SHINGARA S.	90415401	NEW	75/04/27	\$22,466
CLEMSON UNIV. CLEMSON	186610 ENERGY CONSERVATION THROUGH POINT SOURCE RECYCLE WITH HIGH TEMPERATURE HYPERFILTRATION	RISHIP, EUGENE H.	80387501	INCR	76/04/14	\$14,468
CLEMSON UNIV. CLEMSON	186911 CONTROL STRATEGIES FOR THE ACTIVATED SLUDGE PROCESS	KEINATH, THOMAS H.	90435701	NEW	76/02/26	\$15,000
SOUTH CAROLINA, UNIV. OF COLUMBIA	186615 FOURIER TRANSFORM NMR OF METALS OF ENVIRONMENTAL SIGNIFICANCE	ELLIS, PAUL D.	90435901	NEW	76/03/02	\$44,983
SOUTH CAROLINA, UNIV. OF COLUMBIA	186615 THE DYNAMICS OF AN ESTUARY AS A NATURAL ECOSYSTEM	VERBERG, F. JOHN	80440701	NEW	76/04/29	\$50,000
** TRAINING **						
CLEMSON UNIV. CLEMSON	28K159 INTERDISCIPLINARY EDUCATION IN ENVIRONMENTAL SYSTEMS ENGINEERING	PICH, LINVIL G.	90014607	INCR	76/03/11	\$13,000
CLEMSON UNIV. CLEMSON	28K159 PROGRAM GUIDANCE FOR DEVELOPMENT OF STATE WATER POLLUTION CONTROL AGENCY MANPOWER	AUSTIN, J. H.	90014607	INCR	76/05/21	\$30,000
CLEMSON UNIV. CLEMSON	28K159 WATER QUALITY INSTRUCTIONAL RESOURCES INFORMATION SYSTEMS	AUSTIN, J. H.	90037501	NEW	76/04/22	\$28,396
CLEMSON UNIV. CLEMSON	28K159 FOUR-YR. WATER & WASTEWATER TECHNOLOGY CURRICULUM DEVELOPMENT	CHISMAN, JAMES A.	90056001	INCR	76/03/17	\$18,027
CLEMSON UNIV. CLEMSON	28K159 FOUR-YR. WATER & WASTEWATER TECHNOLOGY CURRICULUM DEVELOPMENT	CHISMAN, JAMES A.	90056001	INCR	76/06/03	\$57,000

APPLICANT	MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
S O U T H C A R O L I N A							
** TRAINING **	TEXAS, UNIV. OF AUSTIN	2BK159 TRAINING IN WATER SUPPLY AND POLLUTION CONTROL	WALINA, JOSEPH	90010708	INCR	76/05/11	\$28,000
** FELLOWSHIPS **	CLEMSON UNIV. CLEMSON	2BK159 M.S./ENGR.	TILLWICK, D. C.	91089701	NEW	76/05/26	\$6,500
	SOUTH CAROLINA, UNIV. OF COLUMBIA	2BK159 M.S./PUBLIC HEALTH	BURCKHALTER, J. M.	91089701	NEW	76/04/30	\$6,500
	SOUTH CAROLINA, UNIV. OF COLUMBIA	2BK159 M.S./PUBLIC HEALTH	RUSH, C. W.	91089701	NEW	75/04/25	\$1,240
	SOUTH CAROLINA, UNIV. OF COLUMBIA	2BK159 M.S./PUBLIC HEALTH	SEABROOK, H.	91089001	NEW	76/05/17	\$1,230
	SOUTH CAROLINA, UNIV. OF COLUMBIA	2BK159 M.S./PUBLIC HEALTH	GAYMON, H. L.	91089101	NEW	76/05/26	\$1,230
	SOUTH CAROLINA, UNIV. OF COLUMBIA	2AK139 M.S./ENGR.	WATSON, C. B.	91090001	NEW	76/06/03	\$624
	SOUTH CAROLINA, UNIV. OF COLUMBIA	2AK139 M.S./ENGR.	CAUGHMAN, G. M.	91090101	NEW	76/06/03	\$624
	SOUTH CAROLINA, UNIV. OF COLUMBIA	2AK139 M.S./PUBLIC HEALTH	SMYTH, W. A.	91090401	NEW	75/05/01	\$7,890

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
S O U T H D A K O T A						
** RESEARCH **						
SOUTH DAKOTA STATE UNIV. BROOKINGS	1HB617 ANIMAL WASTE MGMT. IN NORTHERN GREAT PLAINS: AFFECT ON SOIL & RUNOFF WATERS	WIERMA, JOHN L.	80366201	INCR	76/05/03	\$48,460
SOUTH DAKOTA STATE UNIV. BROOKINGS	1BC611 INFILTRATION LAND TREATMENT OF STABILIZATION POND EFFLUENT	DORN BUSH, JAMES N.	80380401	INCR	76/03/01	\$30,390
** DEMONSTRATION **						
EAST DAKOTA CONSERVANCY SUB-DIST. BROOKINGS	2BH612 LAKE COCHRANE PERIMETER ROAD-SEDIMENT CONTROL DAMS	SIEGEL, JERRY L.	80*24801	NEW	76/01/08	\$9,906
** TRAINING **						
SOUTH DAKOTA DEPT OF ENVIRON PROTECT. PIEPRE	2HK572 SOUTH DAKOTA WASTEWATER OPERATOR TRAINING PROJECT.	ALLYN D. LOCKNER, SECR	00815901	NEW	76/06/28	\$19,567
** FELLOWSHIPS **						
SOUTH DAKOTA STATE UNIV. BROOKINGS	2BK159 B.S./SAN. ENGR.	TEMPLETON, D. J.	91096701	NEW	76/05/03	\$6,500

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
T E N N E S S E E						
** RESEARCH **						
NASHVILLE THERMAL TRANSFER CORP. NASHVILLE	EMES24 BAGHOUSE STUDY AS AN EMISSION CONTROL ON A SOLID WASTE INCINERATOR/BOILER	MCDERMOTT, BERNARD A.	90423301	NEW	75/04/01	\$25,000
VANDERBILT UNIV. NASHVILLE	198610 DEVELOPMENT OF BIOLOGICAL SIMULATION MONITOR FOR JT. MUN./INDUSTRIAL TREATMENT SYSTEMS	ECKENFELDER, W. W.	80374001	INCR	76/04/30	\$51,893
VANDERBILT UNIV. NASHVILLE	1E4513 METABOLISM AND TOXIC EFFECTS OF DITHIOCARBAMATE FUNGICIDES IN THE RAT	NEAL, P. A.	80321402	CONT	76/06/11	\$46,718
VANDERBILT UNIV. NASHVILLE	198610 LABORATORY & PILOT PLANT STUDIES ON THE REMOVAL OF HEAVY METALS & FLOURIDE FROM WM BY FOAM FLOTATION	WILSON, DAVID	90443901	NEW	76/04/12	\$64,937
** TRAINING **						
TENN. DEPT. OF HEALTH, WATER QLTY CNTRL NASHVILLE	28P158 MANPOWER GRANT TO TRAIN WWTP OPERATORS	F.W. FOWKLE, MD, COM	00420101	NEW	75/05/18	\$17,511
TENN. DEPT. OF PUBLIC HEALTH NASHVILLE	28K158 WASTEWATER TREATMENT PLANT OPERATOR TRAINING	HUGHES, JACK L.	90035901	INCR	76/03/29	\$10,000
** FELLOWSHIPS **						
EAST TENNESSEE STATE UNIV. JOHNSON CITY	29K139 M.S./ENVON. HEALTH	RUSHING, FRANKLIN W.	91073501	NEW	76/01/29	\$6,500
EAST TENNESSEE STATE UNIV. JOHNSON CITY	2AK139 M.S./ENVON. HEALTH	JONES, P. L.	91078801	NEW	76/06/11	\$5,890
EAST TENNESSEE STATE UNIV. JOHNSON CITY	2HK139 M.S.	RUSSELL, T. M.	91095501	NEW	76/06/09	\$1,082

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
BAYLOR COLLEGE OF MEDICINE HOUSTON	180512 NEW IMPROVED METHODS FOR QUANTITATIVE DETECTION ENTERIC VIRUSES IN POTABLE, RECLAIMED & NATURAL WATERS	MELNICK, JOSEPH L.	80273603	CONT	76/03/12	\$77,972
			80273603	INCR	76/06/11	\$29,000
HOUSTON, UNIV. OF HOUSTON	1E6513 FEASIBILITY OF USING BACTERIAL STRAINS TO TEST ENVIRONMENTAL CARCINOGENS	EVANS, J. E.	90439501	NEW	76/05/18	\$5,000
NORTH TEXAS STATE UNIV. DENTON	1CC614 IDENTIFICATION OF CHLORINATED ORGANIC COMPOUNDS FORMED DURING WASTEWATER CHLORINATION	GLAZE, WILLIAM H.	90300703	CONT	76/02/26	\$50,125
			80330703	INCR	76/05/20	\$12,395
SOUTHWEST FDN. FOR RES. & EDUC. SAN ANTONIO	1AD605 IN VITRO ASSAY OF RELATIVE TOXICITY OF DIESEL-ENGINE EXHAUSTS	MELTZ, MARTIN L.	90370501	INCR	76/05/27	\$40,203
SOUTHWEST RES. INST. SAN ANTONIO	EME625 DEVELOPMENT OF OIL-IN-WATER MONITOR	SILVUS, H. S.	80435801	NEW	76/03/17	\$39,330
TEXAS A&M RES. FDN. COLLEGE STATION	1CC614 ACCUMULATION & PASSAGE OF POLLUTANTS IN DOMESTIC SEPTIC TANK DISPOSAL FIELDS	BROWN, KIRK W.	80295502	INCR	76/03/12	\$45,803
			80295502	INCR	76/04/28	\$114,970
TEXAS A&M RES. FDN. COLLEGE STATION	EME625 COLLECTION AND ASSESSMENT OF SUB-MICRON PARTICULATE MATTER	BENSON, FRED J.	90413001	NEW	76/06/03	\$15,600

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APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
TEXAS						
** RESEARCH **						
TEXAS A&M RES. FDN. COLLEGE STATION	1CC514 PYROGENIC ACTIVITY OF CARBON-FILTERED WATERS	WOLF, HAROLD W.	80442001	NEW	76/02/09	\$68,590
TEXAS A&M UNIV. COLLEGE STATION	1HB617 PROGRAM FOR THE CONTROL OF URBAN COCKROACHES	FRANKIE, G. W.	90306803	CONT	76/06/07	\$42,000
TEXAS A&M UNIV. COLLEGE STATION	1HB517 SALMONELLAE IN FEEDLOT MANURE & ITS SURVIVAL & MOVEMENT IN SOIL	WEAVER, RICHARD W.	80334401	INCR	76/06/07	\$97,580
TEXAS A&M UNIV. COLLEGE STATION	1HB617 US/USSR SYMPOSIUM "MANAGEMENT OF ARTHROPOD, WEEB & DISEASE PESTS OF COTTON, GRAIN SORGHUM & FRUIT"	ADKISSON, PERRY L.	90431401	NEW	76/02/19	\$2,000
TEXAS, UNIV. OF DALLAS	1BA508 ALGAL NUTRIENT AVAILABILITY & LIMITATIONS IN LAKE ONTARIO DURING IFYGL	LEE, G. FRED	80364201	INCR	76/03/12	\$3,376
TEXAS, UNIV. OF AUSTIN	1AA603 AEROSOL DYNAMICS	BROCK, J. R.	80366002	CONT	76/03/17	\$35,000
TEXAS, UNIV. OF AUSTIN	1EA615 DEVELOPMENT & STANDARDIZATION OF IDENTIFICATION & MONITORING TECHNIQUES FOR BACULOVIRUS PESTICIDES	SUMMERS, M. D.	80366602	CONT	76/03/08	\$85,000
TEXAS, UNIV. OF RICHARDSON	1CC614 PROCEDURE FOR EVALUATION OF POTENTIAL GROUNDWATER CONTAMINATION BY HAZARDOUS CHEMICALS	LEE, G. FRED	80454901	NEW	76/05/24	\$80,000
** DEMONSTRATION **						
TEXAS WATER QUALITY BD. AUSTIN	1BC511 DEMO./EVALUATION OF IMPREGNATED CONCRETE PIPE & OTHER METHODS OF INFILTRATION CONTROL	LUDWIG, ALLEN G.	80255101	INCR	76/03/29	\$30,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / CELL	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** TRAINING **						
CENTRAL TEXAS COLLEGE KILLEEN	28K154 VOCATIONAL/TECHNICAL TRAINING PROGRAM FOR ENVIRONMENTAL SERVICE OCCUPATIONS	SWARTZ, PHILLIP P.	90058201	NEW	75/05/03	\$25,000
NORTH TEXAS STATE UNIV. DENTON	28K159 GRADUATE TRAINING IN MICROBIOLOGY, WATER & WASTEWATER	SILVEY, J. K. G.	90011504	INCR	76/06/25	\$20,400
RICE UNIV. HOUSTON	18K159 DEVELOPMENT OF RESEARCH TO SUPPORT PROPOSED RULEMAKING ON HAZARDOUS SUBSTANCES	WARD, C. H.	90017507	INCR	76/02/26	\$99,022
TEXAS A&M UNIV. COLLEGE STATION	28K159 TRAINING IN WASTEWATER TREATMENT & AQUATIC SYSTEM MANAGEMENT	MANN, ROY W.	90012904	INCR	76/06/07	\$17,000
TEXAS A&M UNIV. COLLEGE STATION	28P159 LAB. ANALYTICAL METHODS IN ENVRN. ENGR.	WOLF, HAROLD	90052101	INCR	76/06/03	\$30,000
** FELLOWSHIPS **						
HOUSTON, UNIV. OF HOUSTON	28K139 M.S./ENVRN. ENGR.	ANDERSON, R. L.	91094901	NEW	76/06/25	\$722
HOUSTON, UNIV. OF HOUSTON	28K139 M.S./ENVRN. MGMT.	SPELLER, E. F.	91095001	NEW	76/06/16	\$789
ST. MARY UNIV. SAN ANTONIO	28K159 J.D.	FORRESTER, C. X.	91091001	NEW	75/05/07	\$6,500
TEXAS, UNIV. OF AUSTIN	28K139 M.S./ENVRN. HEALTH ENGR./AIR POLLUTION	SIEVERS, HENRY E.	91039601	INCR	76/06/25	\$1,369
TEXAS, UNIV. OF AUSTIN	28K139 M.S./ENVRN. ENGR.	CADAWAY, JAMES C.	91039501	INCR	75/05/11	\$89

E X A S

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
T E X A S						
** FELLOWSHIPS **						
TEXAS, UNIV. OF AUSTIN	2AK139 M.S./ENVRN. HEALTH ENGR.	SPAW, STEVEN NEAL	91042301	INCR	76/06/09	\$922
TEXAS, UNIV. OF AUSTIN	2AK139 PH.D./ENVRN. HEALTH ENGR.	WAID, KENNETH P.	91042901	INCR	75/05/11	\$595
TEXAS, UNIV. OF AUSTIN	2AK139 M.S./ENVRN. HEALTH ENGR.	MYERS, JAMES C.	91043001	INCR	76/06/16	\$922
TEXAS, UNIV. OF AUSTIN	2AK139 M.S./ENVRN. HEALTH ENGR.	DEW, J. M.	91051701	INCR	76/01/22	\$880
TEXAS, UNIV. OF AUSTIN	2AK139 M.S./CHEMICAL ENGR.	RILSKY, IRVIN LEE	91070601	INCR	76/06/07	\$1,244
TEXAS, UNIV. OF AUSTIN	2AK139 M.S.	PENDLETON, DOYLE R.	91070901	INCR	76/06/11	\$730
TEXAS, UNIV. OF AUSTIN	2AK139 M.S./ENVRN. HEALTH ENGR.	MAGEE, M. L.	91071001	INCR	75/05/03	\$804
TEXAS, UNIV. OF AUSTIN	2AK139 M.S./ENVRN. HEALTH ENGR.	DURPENBERGER, CYPIL J.	91071101	INCR	76/06/03	\$796
TEXAS, UNIV. OF AUSTIN	2AK139 M.S./ENVRN. HEALTH ENGR.	DATTNER, STUART L.	91071201	INCR	76/06/01	\$829
TEXAS, UNIV. OF AUSTIN	2AK139 M.S./ENVRN. HEALTH ENGR.	CUNNINGHAM, JAMES E.	91071401	INCR	76/06/01	\$796

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
T E X A S						
** FELLOWSHIPS **						
TEXAS, UNIV. OF AUSTIN	2AK139 M.S.	LEE, RICHARD P.	91071501	INCR	76/06/19	\$799
TEXAS, UNIV. OF AUSTIN	2AK139 M.S./ENVRN. HEALTH ENGR.	SCHRAUFNAGEL, PATRICIA	91071701	INCR	76/06/01	\$796
TEXAS, UNIV. OF AUSTIN	2AK139 M.S./ENGR.	LAMBETH, B. W.	91079201	NEW	76/05/25	\$4,581
TEXAS, UNIV. OF AUSTIN	2AK139 M.S./CIVIL ENGR.	LAIRD, A. R.	91082901	NEW	76/05/26	\$4,581
TEXAS, UNIV. OF AUSTIN	2BK159 M.S./ENVRN. HEALTH ENGR.	MACHIN, J.	91085301	NEW	75/04/28	\$1,299

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
U T A H						
** RESEARCH **						
UTAH STATE DIV OF HEALTH SALT LAKE CITY	EHE625 AIR QUALITY MONITORING IN ENERGY AREA-THE PROJECT WILL ALLOW BASELINE DATA COLLECTION IN AREAS UTAH	LYMAN J. OLSEN, DIR. O	00813801	NEW	76/03/29	\$37,000
UTAH STATE UNIV. LOGAN	1H8617 ISOLATION CHARACTERIZATION PATHOGENICITY & LAB. & FIELD APPLICATION OF VIRUS IN ALFALFA WFEVIL	YOUSSEF, N. N.	80305803	CONT	76/05/26	\$30,000
UTAH, UNIV. OF SALT LAKE	1AA602 AIR POLLUTANT SORPTION BY VEGETATION IN THE US	HILL, A. CLYDE	80296703	CONT	76/02/23	\$54,720
** TRAINING **						
UTAH STATE UNIV. LOGAN	28K159 GRADUATE TRAINING PROGRAM IN RURAL & AGRICULTURAL WATER	JONES, NORMAN B.	90006906	INCR	76/06/07	\$15,500
** FELLOWSHIPS **						
UTAH STATE UNIV. LOGAN	28K159 M.S./ENGR.	SMITH, G. J.	91061601	INCR	76/05/20	\$1,550
UTAH STATE UNIV. LOGAN	28K159 M.S./CIVIL ENGR.	THOMAS, W. S.	91053101	INCR	76/05/07	\$1,550
UTAH STATE UNIV. LOGAN	28K159 M.S./ENGR.	WIZE, L. J.	91063301	INCR	76/05/07	\$1,550
UTAH STATE UNIV. LOGAN	28K159 M.S./ENGR. SCIENCE	GEORGESON, M. B.	91086501	NEW	76/04/28	\$1,550
UTAH STATE UNIV. LOGAN	28K159 M.S./ENGR.	BOUSFIELD, K. H.	91086601	NEW	76/04/77	\$1,550

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
U T A H						
** FELLOWSHIPS **						
UTAH STATE UNIV. LOGAN	2AK139 M.S./ENVRN. ENGR.	POBERTS, R. L.	91086801	NEW	76/06/03	\$644
UTAH STATE UNIV. LOGAN	2BK159 M.S./ENGR.	BLAKE, D. B.	91088101	NEW	76/04/27	\$1,550
UTAH STATE UNIV. LOGAN	2BK159 M.S./ENVIRONMENTAL ENGINEERING	SERLING, R. A.	91090701	NEW	76/04/27	\$1,550
UTAH STATE UNIV. LOGAN	2BK159 M.S./ENGR.	MOELLER, M. O.	91093601	NEW	76/06/09	\$1,550
UTAH, UNIV. OF SALT LAKE CITY	2AK139 M.S./ENGR. ADMIN.	WATANABE, A. M.	91081101	NEW	76/06/03	\$744

APPLICANT	MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** DEMONSTRATION **	VERMONT AGCY OF ENVRN CONSERV	108058 SOLID WASTE DEMO & RESOURCE RECOVERY SYSTEM GRANT	DR MARTIN L JOHNSON	03111501	NEW	76/06/11	\$45,000
	MONTPELIER						

V E R M O N T

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
VIRGINIA						
** RESEARCH **						
HAMPTON INST. HAMPTON	1HD522 MATRIX-ISOLATION STUDIES INVOLVING THE OXIDATION OF SULFUR DIOXIDE	HUNTER, CHARLES E.	90351602	CONT	76/02/10	\$58,653
NORFOLK STATE COLLEGE NORFOLK	1HD622 PHOTON CORRELATION IN LASER DOPPLER SPECTROSCOPY FOR PARTICLE SIZE MEASUREMENTS	GEORGE, ALEYAMMA	80376501	NEW	76/06/07	\$54,133
ST. PAUL'S COLLEGE LAWRENCEVILLE	1HB617 MATHEMATICAL FORMULATION & ANALYSIS OF PESTICIDE ATTENUATION SUB-MODELS	YATES, JERREL	80431601	INCR	76/05/19	\$5,796
VIRGINIA INST. OF MARINE SCIENCE GLoucester Pt.	ENE625 SUBLETHAL EFFECTS OF CHLORINE ON MARINE VASCULAR PLANTS & DECAPOD CRUSTACEANS	POBERTS, MORRIS H.	80387201	INCR	76/03/23	\$49,759
** DEMONSTRATION **						
RESOURCE RECOVERY STUDY COMM. CHAFFLOTTSVILLE	2DH297 MUNICIPAL SOLID WASTE RESOURCE RECOVERY IMPLEMENTATION PROGRAM	BRUNTON, L. A.	80478501	NEW	76/05/30	\$50,000
VIRGINIA POLYTECHNIC INSTITUTE BLACKSBURG	1BR610 MINIMIZATION OF WATER USE IN LEAFY VEGETABLE WASHERS	WRIGHT, M. E.	90295901	INCR	76/04/26	\$18,313
** TRAINING **						
NATIONAL RECREATION AND PARK ASSOC. ARLINGTON	29K159 INVOLVE PARK AND RECREATION AGENCIES IN WATER POLLUTION CONTROL	VERHOVEN, P. J.	90059001	NEW	76/05/06	\$30,083
VA. STATE WATER CONTROL RD. RICHMOND	2HK572 WATER PLANT GROWTH VIA VARIOUS APPROACHES	W.D. JONES	00311801	NEW	76/05/10	\$8,750
VIRGINIA POLY. INST. & STATE UNIV. BLACKSBURG	29K159 WATER RESOURCES MANAGEMENT & QUALITY CONTROL	KING, PAUL H.	90033308	INCR	76/06/11	\$18,500

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
V I R G I N I A						
** TRAINING **						
VIRGINIA STATE WTR CONT BOARD RICHMOND	28P159 TO ASSIST THE STATE OF VIRGINIA IN TRAINING WASTEWATER TREATMENT PLANT OPERATORS	JONES, WESLEY D.	00311002	CONT	76/06/18	\$20,000
** FELLOWSHIPS **						
VIRGINIA INST. OF MARINE SCIENCE GLOUCESTER	28K159 M.S./MARINE BIOLOGY	FISHER, D. J.	91070901	NEW	75/05/05	\$5,500
VIRGINIA POLYTECHNIC INST. & STATE UNIV. BLACKSBURG	28K159 M.S./SAN. ENGR.	COX, H. W.	91091601	NEW	76/05/18	\$4,556
VIRGINIA, UNIV. OF CHARLOTTESVILLE	28K159 M.S./ENVRN. PLANNING	ADGATE, KATHLEEN J.	91073201	NEW	76/01/15	\$4,495

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
W A S H I N G T O N						
** RESEARCH **						
SEATTLE WATER DEPT., CITY OF SEATTLE	10C614 SEATTLE TOLT WATER SUPPLY MIXED ASBESTOS FORMS REMOVAL STUDY	COURCHENE, JOHN; C.	90442201	NEW	76/04/13	\$82,881
WASHINGTON STATE UNIV. PULLMAN	1AA503 MEASUREMENT OF TROPOSPHERIC HALOCARBONS BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY	RASMUSSEN, REINHOLD A.	90403301	INCR	76/01/06	\$19,582
WASHINGTON STATE UNIV. PULLMAN	1AA603 MEASUREMENT OF TROPOSPHERIC HALOCARBONS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY	RASMUSSEN, R. A.	80403302	CONT	76/04/12	\$72,000
WASHINGTON, UNIV. OF SEATTLE	1BA508 CHEMICAL INHIBITION	PAVLOU, SPYROS P.	90035204	INCR	76/03/24	\$60,496
WASHINGTON, UNIV. OF SEATTLE	10C618 AQUEOUS MICROWAVE TRANSFORMATION OF GARBAGE	ALLAN, G. GRAHAM	90412601	NEW	76/06/07	\$8,650
WASHINGTON, UNIV. OF SEATTLE	EHE624 FINE PARTICLE CONTROL WITH U.W. ELECTROSTATIC SCRUBBER	PILAT, MICHAEL J.	90439301	NEW	76/01/30	\$74,485
WASHINGTON, UNIV. OF SEATTLE	2BH412 REHABILITATION EFFECTS IN LONG LAKE, WASHINGTON	WELCH, F. B.	90458901	NEW	76/05/27	\$90,000
** DEMONSTRATION **						
KITSAP CNTY. PORT ORCHARD	29H412 LONG LAKE REHABILITATION PROGRAM	MAHAN, WILLIAM H.	90422201	NEW	76/01/09	\$355,970
SKOKOMISH INDIAN TRIBE SHELTON	18B610 SKOKOMISH SALMON PROCESSING PLANT WASTEWATER TREATMENT SYSTEMS	SMITH, WILLIAM L.	90391101	INCR	76/06/01	\$28,200
SPHONMISH CNTY. METRO. MUN. CORP. EVERETT	2BH412 CLEAN LAKES-REHABILITATION FOR SPADA LAKE & LAKE CHAPLAIN	FORSBERG, N. RICHARD	90420801	NEW	76/01/09	\$99,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
W A S H I N G T O N						
** DEMONSTRATION ** SNOKIST GROWERS YAKIMA	1BR510 CANNERY WASTEWATER BIOLOGICAL SOLIDS CATTLE FEEDING PROJECT	HART, HERBERT H.	90330701	INCR	76/06/22	\$1,716
** TRAINING ** WA DEPARTMENT OF ECOLOGY OLYMPIA	2HK572 WATER POLLUTION CONTROL STATE OPERATOR TRAINING GRANT	JOHN F. SPENCER	00011201	NEW	76/05/26	\$20,000
WA DEPT. OF SOCIAL & HEALTH SERVICES OLYMPIA	2HK572 INSTRUCTOR TRAINING COURSE ON PUBLIC WATER SYSTEM SUPERVISION	JOHN A. BEARE M.D., DIR	00012101	NEW	76/06/30	\$6,764
WASHINGTON, UNIV. OF SEATTLE	2BK159 RESEARCH TRAINING & PROFESSIONAL DEVELOPMENT APPLIED TO STATE NEEDS	SYLVESTER, ROBERT D.	90031305	INCR	76/03/11	\$14,065
** FELLOWSHIPS ** WASHINGTON STATE UNIV. SPOKANE	2AK139 M.S./ENVRN. ENGR.	POTTRATZ, DOUGLAS K.	91027901	INCR	76/01/26	\$1,724
WASHINGTON STATE UNIV. PULLMAN	2AK139 M.S./ENGR.	SHERARD, A. E.	91090001	NEW	75/05/27	\$4,513
WESTERN WASHINGTON STATE COLLEGE BELLINGHAM	2BK159 M.S./CIVIL ENGR.	SPEAR, A.	91095701	NEW	76/06/22	\$6,500

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
W E S T V I R G I N I A						
** RESEARCH **						
WEST VIRGINIA SURFACE MINING CHARLESTON	FHE623 ENVRN. IMPACT OF STEEP SLOPE MINING	LUSK, B.	80322402	CONT	76/06/11	\$46,000
WEST VIRGINIA UNIV. MORGANTOWN	1E4615 EFFECT OF PESTICIDE INTERACTIONS UPON THE REPRODUCTIVE SYSTEM	THOMAS, JOHN A.	80357802	CONT	76/01/06	\$34,282
** FELLOWSHIPS **						
WEST VIRGINIA COLLEGE GRAD STUDIES INSTITUTE	28K159 M.S./PUBLIC ADMINISTRATION	ROYLES, DENNIS L.	91072501	NEW	76/04/28	\$1,250
WEST VIRGINIA COLLEGE GRAD. STUDIES INSTITUTE	28K159 M.S./ENVRN. ENGR.	EDWARDS, HIRAM S.	91070701	INCR	76/01/29	\$3,250
WEST VIRGINIA COLLEGE OF GRAD STUDIES INSTITUTE	28K159 ENVRN. STUDIES	ISLAM, NJRUL	91053401	INCR	76/05/11	\$3,250
WEST VIRGINIA, UNIV. OF MORGANTOWN	2AK139 M.S.	JOSEPH, G.	91083601	NEW	76/05/21	\$8,954

APPLICANT	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
M I S C O N S I N						
** RESEARCH **						
WISCONSIN DNR MADISON	28H155 MENDOTA RIVER WATERSHED STUDY OF MAJOR & TRACE CONSTITUENTS	JOHN KONRAD SUPV.	00514201	INCR	76/03/24	\$42,000
WISCONSIN, UNIV. OF MADISON	1EA615 MECHANISMS OF PESTICIDE DEGRADATION	MATSUMURA, FUMIO	80106012	CONT	76/04/27	\$49,524
WISCONSIN, UNIV. OF MILWAUKEE	1BA609 DETERMINATION OF ATMOSPHERIC PHOSPHORUS ADDITION TO LAKE MICHIGAN	BEETON, A. W.	80323802	CONT	76/02/10	\$33,000
WISCONSIN, UNIV. OF SUPERIOR	1BA509 INFLUENCE OF LAKE RESTORATION ON THE FISHERY RESOURCE OF SHAGAWA LAKE	SMENSON, W.	80367302	CONT	76/05/26	\$25,719
WISCONSIN, UNIV. OF SUPERIOR	EHE625 STATIC COAL STORAGE BIOLOGIC AND CHEMICAL EFFECTS ON THE AQUATIC ENVIRN.	COWARD, N. A.	80393702	CONT	76/06/30	\$25,217
WISCONSIN, UNIV. OF MADISON	1BA608 NUTRITIONAL ECOLOGY OF GREAT LAKES CHADOPHORA SP.	GERLOFF, GERALD C.	80440201	NEW	76/03/17	\$37,491
** DEMONSTRATION **						
SUPERIOR FIBER PRODUCTS, INC SUPERIOR	1BB610 TOTALLY CLOSED WHITENWATER SYSTEM FOR THE MANUFACTURE OF FIBERBOARD BY THE WET PROCESS SYSTEM	HEDMAN, CLIFFORD H.	80430601	NEW	76/02/26	\$100,000
WISCONSIN DEPT. OF NATURAL RESOURCES MADISON	2BH412 HALF MOON LAKE PROTECTION & REHABILITATION PROJECT	VOIGT, L. P.	80423401	NEW	76/01/08	\$371,500
WISCONSIN DEPT. OF NATURAL RESOURCES MADISON	2BH412 LILLY LAKE PROTECTION & REHABILITATION PROJECT EVALUATION	VOIGT, L. P.	90423501	NEW	76/01/08	\$273,000
WISCONSIN DEPT. OF NATURAL RESOURCES MADISON	2BH412 MIRROR & SHADOW LAKES PROTECTION & REHABILITATION	VOIGT, L. P.	90423701	NEW	76/01/08	\$215,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** DEMONSTRATION **						
WISCONSIN DEPT. OF NATURAL RESOURCES MADISON	28K412 WHITE CLAY LAKE PROTECTION & REHABILITATION PROJECT EVALUATION	VOIGHT, L. P.	80423801	NEW	76/01/03	\$107,200
** TRAINING **						
MARQUETTE UNIV. MILWAUKEE	28K159 TRAINING IN WATER POLLUTION CONTROL & ENVIRONMENTAL ENGINEERING	KIPP, RAYMOND J.	90001409	INCR	75/06/15	\$21,500
WISCONSIN, UNIV. OF MADISON	28P159 DEVELOP FACILITY PLANNING MATERIALS FOR SHORT COURSE	R W CRICKSON DIR	00529501	NEW	76/02/25	\$6,928
WISCONSIN, UNIV. OF MADISON	28K159 PROFESSIONAL TRAINING IN ANALYSIS & DESIGN OF WATER SUPPLY & POLLUTION CONTROL SYSTEMS	POKORSKI, LAWRENCE B.	90015505	INCR	76/06/30	\$30,104
** FELLOWSHIPS **						
WISCONSIN, UNIV. OF MADISON	28K139 M.S., MECHANICAL ENGR.	ESTRADA, E. Y.	91079601	NEW	76/06/16	\$1,180
WISCONSIN, UNIV. OF MADISON	28K159 M.S./WATER RESOURCES MANAGEMENT	PERSYH, L.	91097601	NEW	76/04/29	\$1,946
WISCONSIN, UNIV. OF MADISON	28K159 M.S.	MCCORMICK, S. J.	91099401	NEW	76/04/27	\$3,470
WISCONSIN, UNIV. OF MADISON	28K159 M.S.	KESSLER, K. E.	91099501	NEW	76/04/27	\$559
			91099501	INCR	75/05/15	\$350

M I S C O N S I N

AMOUNT OF
GRANT AWARD

DATE OF
AWARD

TYPE OF
GRANT

GRANT NO

PROJECT DIRECTOR /
FELLOW

PROGRAM
ELEMENT
TITLE

APPLICANT

MUNICIPALITY

W I S C O N S I N

** FELLOWSHIPS **
WISCONSIN, UNIV. OF
MADISON

28K159
W. S. WATER RESOURCES

LEWIS, J. L.

91089601

NEW

76/05/11

\$1,070

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APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
W Y O M I N G						
** RESEARCH ** WYOMING, UNIV. OF LARAMIE	1AA603 INADVERTENT WEATHER MODIFICATION BY AIR POLLUTION	AVER, AUGUST H.	80087505	INCR	76/05/24	\$35,000
** DEMONSTRATION ** WYOMING DEPT OF ENVIRONMENTAL QUALITY CHEYENNE	2DH632 SOLID WASTE PLANNING GRANT	ROBERT F. SUNDIN, DIRE	00911301	INCR	75/02/17	\$5,030

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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T R U S T T E R R I T O R I E S

** TRAINING **

TRUST TERRITORY ENVRN. PROTECTION BD.

SIREN, NACHSA
ON SITE TRAINING FOR SEWAGE TREATMENT PLANT
OPERATIONS AND MAINTENANCE

00912001 NEW 76/05/21 \$760,521

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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VIRGIN ISLANDS

** TRAINING **

VIRGIN ISLANDS. GOVT. OF
ST. THOMAS

28P159
SUMMER EMPLOYMENT IN ENVIRONMENTAL PROTECTION
PROJECT

93059701 NEW 76/05/14 \$3,500

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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FOREIGN COUNTRIES
AUSTRIA

•• RESEARCH •• VIENNA, UNIV. OF VIENNA	140606 STUDIES ON AEROSOLS OF SIZES DOWN TO .05 MICRON	PREINING, OTMAR	80198303	CONT	76/03/08	83,300
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APPLICANT	MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
FOREIGN COUNTRIES							
CANADA							
** RESEARCH **		1AA601	SKORYNA, STANLEY	80282402	IMCR	76/05/07	822,315
MCGILL UNIV.	MONTREAL	ACTIVE BINDING OF METAL POLLUTANTS BY NATURAL DIETARY COMPONENTS					
TORONTO, UNIV. OF	TORONTO	XH1627	HUTCHINSON, T. C.	80397901	IMCR	76/02/26	85,000
		INTERNATIONAL CONFERENCE ON HEAVY METALS IN THE ENVIRONMENT					

AMOUNT OF
GRANT AWARD

DATE OF
AWARD

TYPE OF
GRANT

GRANT NO

PROJECT DIRECTOR /
FELLOW

PROGRAM
ELEMENT
TITLE

APPLICANT

MUNICIPALITY

FOREIGN COUNTRIES
CHILE

** RESEARCH **
CONCEPCION UNIV.
CONCEPCION

EMERZS
MACROBENTHIC SURVEY IN VICINITY OF METULA
OIL SPILL IN STRAITS OF MAGALLA

90451601

NEW

76/06/18

867,380

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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FOREIGN COUNTRIES
GERMANY

** RESEARCH **
INSTITUT FUR AEROBIOLOGIE
SAUFERLAND

FHE625 DESIGN & PERFORMANCE OF AEROSOL MASS DISTRIBUTION MONITOR	STOBER, W.	80359202	CONT	76/05/18	886,700
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APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
F O R E I G N C O U N T R I E S						
ISRAEL						
** RESEARCH **						
HEBRW UNIV. JERUSALEM	180612 DEVELOPMENT OF METHODS FOR THE DETECTION AND INACTIVATION OF VIRUSES IN VARIOUS WATER	SHUVAL, M. I.	80351002	CONT	76/04/30	\$59,000
ISRAEL INST. OF TECH.-TECHNION HAIFA	180612 INDICATORS OF ENTERIC VIRUSES IN WASTE & OTHER WATERS	KOTT, YEHUDA	90195003	CONT	76/01/20	\$35,000

APPLICANT	MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD

FOREIGN COUNTRIES

** RESEARCH **

ASSOCIAZIONE NAZIONALE DI INGEGNERIA
MILANO

IHD622 DE FRUJA FRANGIPANE, E
SECOND ISWA CONGRESS: SOLID WASTE MANAGEMENT

NEW 90459301 76/06/17 \$14,000

APPLICANT MUNICIPALITY	PROGRAM ELEMENT TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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FOREIGN COUNTRIES
YUGOSLAVIA

** RESEARCH **

INSTITUTE FOR MEDICAL RES.
ZAGREB

LEASIS
TOXICOLOGY OF PESTICIDES
REINER, E.

80453901 NEW 76/05/26 \$50.000

SECTION II

GRANT NUMBER	STATE	PROGRAM	APPLICANT
000108-010	ID	TRAINING	ID DEPT. OF HEALTH & WELFARE
000109-010	OR	TRAINING	LINN-BENTON COMMUNITY COLLEGE
000112-010	WA	TRAINING	WA DEPARTMENT OF ECOLOGY
000114-010	AK	TRAINING	AK DEPT. OF ENVN. CONSERVATION
000121-010	WA	TRAINING	WA DEPT. OF SOCIAL & HEALTH SERVICES
001087-010	MA	TRAINING	BOSTON COLLEGE
001087-011	MA	TRAINING	BOSTON COLLEGE
001107-010	RI	DEMONSTRATION	RHODE ISLAND, STATE OF
001109-010	ME	DEMONSTRATION	MAINE DEPT. OF ENVN. PROTECT
001116-010	VT	DEMONSTRATION	VERMONT AGCY OF ENVN CONSERV
001117-010	NH	DEMONSTRATION	NEW HAMPSHIRE PUBLIC HLTH DIV
001119-010	MA	TRAINING	ROXBURY-DORCHESTER BEAUT. PRG.
002132-010	NJ	TRAINING	NEW JERSEY DEPT OF ENVN. PROTECTION
003108-020	PA	TRAINING	PA DEPT. OF COMMUNITY AFFAIRS
003110-020	VA	TRAINING	VIRGINIA STATE WTR CONT BOARD
003111-020	MD	TRAINING	MD DEPT OF NAT RES
003118-010	VA	TRAINING	VA. STATE WATER CONTROL BD.
004172-010	FL	TRAINING	FLORIDA DEPT OF ENVIRONMENTAL REG.
004175-010	MS	TRAINING	MISSISSIPPI STATE BOARD OF HEALTH
004179-010	NC	TRAINING	NORTH CAROLINA DEPT. NAT. & ECON. RES.
004186-010	GA	TRAINING	GEORGIA ENVIRONMENTAL PROTECTION DIV
004188-010	AL	TRAINING	JEFFERSON COUNTY BOARD OF EDUCATION
004191-010	KY	TRAINING	KENTUCKY DEPT OF NAT RES & ENVIR PROT
004201-010	TN	TRAINING	TENN DEPT OF HEALTH, WATER QLTY CNTRL
005142-014	WI	RESEARCH	WISCONSIN DNR
005207-018	IL	RESEARCH	CANADA DEPT OF ENVIRONMENT
005285-010	WI	TRAINING	WISCONSIN, UNIV. OF
005286-010	MN	RESEARCH	MINNESOTA, UNIV. OF
005301-010	IL	RESEARCH	GOVERNORS STATE UNIV
006112-020	AR	TRAINING	ARK DEPT POLLUTION CONTROL & ECOLOGY
006115-010	LA	TRAINING	DELGADO JR COLLEGE
006119-012	NH	TRAINING	NEW MEXICO STATE UNIV.
007053-011	MO	TRAINING	DEPARTMENT OF NATURAL RESOURCES
007074-010	NB	TRAINING	HASTINGS, CENTRAL TECH COMM COL AREA
007075-010	MO	TRAINING	NEOSHO WATER & WASTEWATER TECH SCHOOL
007076-010	MO	TRAINING	ST LOUIS, JUNIOR COLLEGE DISTRICT
007077-010	IA	TRAINING	IOWA DEPT. OF ENVIRONMENTAL QUALITY
007078-010	NB	TRAINING	NORTH PLATTE MID-PLAINS COMM COLLEGE
007079-010	KS	TRAINING	DODGE CITY COMMUNITY COLLEGE
007380-010	MO	TRAINING	PENN VALLEY COMMUNITY COLLEGE
007383-010	KS	TRAINING	KANSAS DEPARTMENT OF HEALTH & ENVIRON
007085-010	MO	TRAINING	COM SVC BROADCASTING - MID-AMERICA INC
007086-010	MO	TRAINING	THE CURATORS OF THE UNIV OF MISSOURI
007088-010	NB	TRAINING	LEAGUE OF NEBR MUNICIPALITIES UTIL SEC
007092-010	IA	TRAINING	KIRKWOOD COMMUNITY COLLEGE
007093-010	IA	TRAINING	IOWA DEPT OF ENVIRONMENTAL QUALITY
007094-010	NB	TRAINING	NEBRASKA DEPT ENVIRONMENTAL CONTROL
008113-011	WY	DEMONSTRATION	WYOMING DEPT OF ENVIRONMENTAL QUALITY
008117-012	MT	DEMONSTRATION	MONTANA DEPT. OF HEALTH & ENVIR SCIENC
008127-010	ND	RESEARCH	NORTH DAKOTA STATE DEPT OF HEALTH
008131-010	CC	RESEARCH	COLORADO DEPT OF HEALTH, AIR POLLUTION
008135-010	CO	TRAINING	COLORADO STATE UNIVERSITY

GRANT NUMBER	STATE	PROGRAM	APPLICANT
008138-010	UT	RESEARCH	UTAH STATE DIV OF HEALTH
008142-010	MT	TRAINING	EMPLOYMENT SECURITY DIVISION
008147-010	MT	TRAINING	MONTANA STATE DEPT OF HEALTH
008155-010	CO	TRAINING	COLORADO DEPT. OF HEALTH
008159-010	SD	TRAINING	SOUTH DAKOTA DEPT OF ENVIRON PROTECT.
008161-010	CO	TRAINING	COLORADO DEPT OF HEALTH
008166-010	MT	TRAINING	MONTANA STATE DEPT OF HEALTH & SCIF
009107-010	CA	TRAINING	CALIF ST BD OF FIRE SVCS
009119-010	CA	TRAINING	VENTURA REG CNTY SAN D
009120-010	CA	TRAINING	TRUST TERRITORY ENVRN. PROTECTION BD.
009123-010	HI	TRAINING	HAWAII DEPT. OF HEALTH
800188-031	LA	RESEARCH	LOUISIANA STATE UNIV. & A&M COLLEGE
800362-043	WA	RESEARCH	WASHINGTON, UNIV. OF
800397-042	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
800875-055	WY	RESEARCH	WYOMING, UNIV. OF
800916-040	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
800916-041	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
800916-042	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
801001-024	MA	RESEARCH	WOODS HOLE OCEANOGRAPHIC INST.
801060-120	WI	RESEARCH	WISCONSIN, UNIV. OF
801301-051	MN	RESEARCH	MINNESOTA, UNIV. OF
801533-015	MD	DEMONSTRATION	BALTIMORE, CITY OF
801588-016	CA	DEMONSTRATION	SAN DIEGO CNTY.
801950-030	FC	RESEARCH	ISRAEL INST. OF TECH.-TECHNION
801951-030	PA	RESEARCH	PHILADELPHIA ACADEMY NATURAL SCIENCES
801983-030	FC	RESEARCH	VIENNA, UNIV. OF
802005-070	KY	RESEARCH	KENTUCKY, UNIV. OF
802037-024	MA	DEMONSTRATION	WOODS HOLE OCEANOGRAPHIC INST.
802160-040	CA	RESEARCH	CALIFORNIA INST. OF TECH.
802288-032	CA	RESEARCH	STANFORD RES. INST.
802336-030	MS	RESEARCH	ALCORN STATE UNIV.
802400-014	NY	DEMONSTRATION	ONONDAGA CNTY. DEPT. PUBLIC WORKS
802411-021	FL	RESEARCH	FLORIDA, UNIV. OF
802411-023	FL	RESEARCH	FLORIDA, UNIV. OF
802472-024	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
802511-031	PA	RESEARCH	DREXEL UNIV.
802516-040	OH	RESEARCH	OHIO STATE UNIV RES. FDN.
802543-032	OH	RESEARCH	OHIO STATE UNIV.
802547-040	MO	RESEARCH	MISSOURI, UNIV. OF
802651-013	TX	DEMONSTRATION	TEXAS WATER QUALITY BD.
802656-030	ME	RESEARCH	MAINE DEPT. OF MARINE RESOURCES
802687-022	CA	RESEARCH	AEROSPACE CORP.
802706-024	NY	RESEARCH	NEW YORK STATE UNIV. RES. FDN.
802736-030	TX	RESEARCH	BAYLOR COLLEGE OF MEDICINE
802736-031	TX	RESEARCH	BAYLOR COLLEGE OF MEDICINE
802759-030	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
802824-022	FC	RESEARCH	MCGILL UNIV.
802839-030	PA	RESEARCH	PENNSYLVANIA MEDICAL COLLEGE
802913-030	FL	RESEARCH	FLORIDA STATE UNIV.
802914-030	FL	RESEARCH	FLORIDA STATE UNIV.
802914-031	MN	RESEARCH	MINNESOTA, UNIV. OF
802914-031	MN	RESEARCH	MINNESOTA, UNIV. OF
802940-013	CO	DEMONSTRATION	COLORADO STATE UNIV.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
802955-022	TX	RESEARCH	TEXAS A&M RES. FDN.
802955-023	TX	RESEARCH	TEXAS A&M RES. FDN.
802958-016	VA	DEMONSTRATION	VIRGINIA POLYTECHNIC INSTITUTE
802959-022	GA	RESEARCH	GEORGIA, UNIV. OF
802964-030	KY	RESEARCH	MURRAY STATE UNIV.
802967-030	UT	RESEARCH	UTAH, UNIV. OF
802985-030	CO	DEMONSTRATION	COLORADO STATE UNIV.
802988-020	MA	RESEARCH	HARVARD UNIV.
803007-030	TX	RESEARCH	NORTH TEXAS STATE UNIV.
803007-031	TX	RESEARCH	NORTH TEXAS STATE UNIV.
803018-030	NC	RESEARCH	DUKE UNIV.
803020-030	PA	RESEARCH	CARNEGIE-MELLON UNIV.
803030-030	NY	RESEARCH	MANHATTAN COLLEGE
803036-023	PA	RESEARCH	ST. VINCENT COLLEGE
803037-020	MI	RESEARCH	MICHIGAN, UNIV. OF
803058-030	UT	RESEARCH	UTAH STATE UNIV.
803065-030	NY	RESEARCH	ROCHESTER, UNIV. OF
803066-022	DC	RESEARCH	HOWARD UNIV.
803068-030	TX	RESEARCH	TEXAS A&M UNIV.
803069-014	MA	RESEARCH	MASSACHUSETTS, UNIV. OF
803078-031	IL	RESEARCH	IIT RES. INST.
803090-020	OR	RESEARCH	OREGON STATE UNIV.
803097-030	OK	RESEARCH	OKLAHOMA STATE UNIV.
803109-030	NY	RESEARCH	NEW YORK, UNIV. OF
803115-030	MO	RESEARCH	WASHINGTON UNIV.
803124-030	MI	RESEARCH	MICHIGAN STATE UNIV.
803154-021	LA	RESEARCH	GRAMBLING STATE UNIV.
803176-030	CO	RESEARCH	COLORADO STATE UNIV.
803213-030	MT	RESEARCH	MONTANA STATE UNIV.
803218-015	OK	RESEARCH	OKLAHOMA STATE DEPT. OF HEALTH
803224-020	WV	RESEARCH	WEST VIRGINIA SURFACE MINING
803238-020	WI	RESEARCH	WISCONSIN, UNIV. OF
803243-030	RI	RESEARCH	RHODE ISLAND, UNIV. OF
803244-021	MA	RESEARCH	SOUTHEASTERN MASSACHUSETTS UNIV.
803249-021	IL	RESEARCH	ILLINOIS, UNIV. OF
803251-015	DC	DEMONSTRATION	NATIONAL CANNERS ASSOC.
803254-032	NY	RESEARCH	CENTER FOR POLICY RES., INC.
803283-030	CA	RESEARCH	AEROSPACE CORP.
803295-013	OR	DEMONSTRATION	BEND, CITY OF
803307-016	WA	DEMONSTRATION	SNOKIST GROWERS
803312-013	DC	DEMONSTRATION	AMERICAN FROZEN FOOD INST.
803319-010	IN	RESEARCH	PURDUE RES. FDN.
803328-030	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
803339-030	FL	RESEARCH	FLORIDA STATE UNIV.
803344-012	TX	RESEARCH	TEXAS A&M UNIV.
803358-013	IN	DEMONSTRATION	CROWN CHEMICAL CO., INC.
803360-020	MA	RESEARCH	HARVARD COLLEGE
803360-021	MA	RESEARCH	HARVARD COLLEGE
803378-014	CO	RESEARCH	COLORADO STATE UNIV.
803401-021	FL	RESEARCH	MIAMI, UNIV. OF
803430-012	GA	RESEARCH	GEORGIA INST. OF TECH.
803461-011	NC	RESEARCH	NORTH CAROLINA, UNIV. OF

GRANT NUMBER	STATE	PROGRAM	APPLICANT
803473-020	IL	RESEARCH	ILLINOIS, UNIV. OF
803484-020	PA	RESEARCH	THOMAS JEFFERSON UNIV.
803494-020	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
803510-020	PC	RESEARCH	HEBREN UNIV.
803516-020	VA	RESEARCH	HAMPTON INST.
803548-020	CA	RESEARCH	SANTA CLARA, UNIV. OF
803560-020	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
803561-020	DC	RESEARCH	HONARD UNIV.
803565-020	MM	DEMONSTRATION	NEW MEXICO STATE UNIV.
803566-020	MT	RESEARCH	NORTHERN CHEYENNE TRIBAL COUNCIL
803572-020	CO	RESEARCH	COLORADO STATE UNIV.
803578-020	WV	RESEARCH	WEST VIRGINIA UNIV.
803590-012	CO	RESEARCH	DENVER, UNIV. OF
803592-020	PC	RESEARCH	INSTITUT FUR AEROBIOLOGIE
803593-020	PA	RESEARCH	AMERICAN SOCIETY FOR TESTING&MATERIALS
803603-020	CA	RESEARCH	CALIFORNIA, UNIV. OF
803607-020	FL	RESEARCH	FLORIDA, UNIV. OF
803612-011	LA	RESEARCH	LOUISIANA STATE UNIV.-&M COLLEGE
803613-012	PA	RESEARCH	FRANKLIN INST. RES. LAB.
803620-012	NJ	RESEARCH	AMERICAN ELECTROPLATERS' SOCIETY, INC.
803631-020	MA	RESEARCH	HARVARD UNIV.
803642-011	TX	RESEARCH	TEXAS, UNIV. OF
803643-020	OH	RESEARCH	CINCINNATI, UNIV. OF
803643-022	OH	RESEARCH	CINCINNATI, UNIV. OF
803645-020	CO	RESEARCH	COLORADO, UNIV. OF
803645-021	CO	RESEARCH	COLORADO, UNIV. OF
803650-010	LA	RESEARCH	SOUTHERN UNIV.
803651-020	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
803660-020	TX	RESEARCH	TEXAS, UNIV. OF
803660-021	TX	RESEARCH	TEXAS, UNIV. OF
803662-011	SD	RESEARCH	SOUTH DAKOTA STATE UNIV.
803664-011	NY	RESEARCH	NEW YORK UNIV.
803666-020	TX	RESEARCH	TEXAS, UNIV. OF
803673-020	WI	RESEARCH	WISCONSIN, UNIV. OF
803678-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
803680-011	NY	RESEARCH	MANHATTAN COLLEGE
803680-020	NY	RESEARCH	MANHATTAN COLLEGE
803683-011	MA	DEMONSTRATION	SOMERVILLE, CITY OF
803685-012	CO	RESEARCH	COLORADO STATE UNIV.
803691-020	NY	RESEARCH	CORNELL UNIV.
803704-020	OH	RESEARCH	CASE WESTERN RESERVE UNIV.
803705-012	TX	RESEARCH	SOUTHWEST FDN. FOR RES. & EDUC.
803712-020	MA	RESEARCH	MASSACHUSETTS, UNIV. OF
803715-020	AZ	RESEARCH	ARIZONA, UNIV. OF
803717-012	NJ	RESEARCH	NEW JERSEY INST. OF TECH.
803722-012	CA	RESEARCH	HYDROCOMP, INC.
803727-020	MT	RESEARCH	MONTANA STATE UNIV.
803728-011	RI	RESEARCH	RHODE ISLAND, UNIV. OF
803740-011	TN	RESEARCH	VANDERBILT UNIV.
803743-020	CA	DEMONSTRATION	SAN FRANCISCO, CITY OF
803744-020	MM	DEMONSTRATION	MINNESOTA POLLUTION CONTROL AGENCY
803753-011	NJ	RESEARCH	AMERICAN ELECTROPLATERS' SOCIETY, INC.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
803753-012	NJ	RESEARCH	AMERICAN ELECTROPLATERS' SOCIETY, INC.
803762-020	NJ	RESEARCH	RUTGERS UNIV./COOK COLLEGE
803765-010	VA	RESEARCH	NORFOLK STATE COLLEGE
803770-013	MN	DEMONSTRATION	NORTHERN STATES POWER CO.
803785-020	MI	RESEARCH	MICHIGAN STATE UNIV.
803798-012	CA	RESEARCH	CALIFORNIA, UNIV. OF
803804-011	SD	RESEARCH	SOUTH DAKOTA STATE UNIV.
803819-020	OR	RESEARCH	OREGON STATE UNIV.
803828-011	ME	DEMONSTRATION	BANGOR, CITY OF
803834-011	NB	RESEARCH	NEBRASKA, UNIV. OF
803842-020	MS	RESEARCH	GULF COAST RES. LAB.
803846-020	CA	RESEARCH	STANFORD RES. INST.
803851-012	MN	RESEARCH	MINNESOTA, UNIV. OF
803851-020	MN	RESEARCH	MICHIGAN STATE UNIV.
803859-020	MI	RESEARCH	VIRGINIA INST. OF MARINE SCIENCE
803872-012	VA	RESEARCH	ORANGE CNTY. WATER DIST.
803873-011	CA	DEMONSTRATION	CLEMSON UNIV.
803873-012	SC	RESEARCH	PENNSYLVANIA STATE UNIV.
803882-020	PA	RESEARCH	SCRIPPS CLINIC & RES. FDN.
803885-010	CA	RESEARCH	SCRIPPS CLINIC & RES. FDN.
803885-011	CA	RESEARCH	NATIONAL WATER WELL ASSOC.
803889-012	OH	RESEARCH	WASHINGTON UNIV.
803896-013	MO	RESEARCH	WASHINGTON UNIV.
803896-020	MO	RESEARCH	WASHINGTON UNIV.
803908-020	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
803911-011	WA	RESEARCH	SKOKOMISH INDIAN TRIBE
803913-020	CA	DEMONSTRATION	CALIFORNIA, UNIV. OF
803914-020	TN	RESEARCH	VANDERBILT UNIV.
803918-012	IL	RESEARCH	ILLINOIS, UNIV. OF
803923-011	MT	RESEARCH	OIL SPILL CONTROL ASSOC. OF AMERICA
803937-020	WI	RESEARCH	WISCONSIN, UNIV. OF
803952-011	GA	RESEARCH	GEORGIA INST. OF TECH.
803956-010	KY	DEMONSTRATION	KENTUCKY DEPT. OF NATURAL RESOURCES
803979-011	PC	RESEARCH	TORONTO, UNIV. OF
803988-011	AZ	RESEARCH	ARIZONA, UNIV. OF
803997-010	FL	RESEARCH	FLORIDA, UNIV. OF
803999-010	PA	RESEARCH	DRACO CORP.
804008-022	OH	RESEARCH	BATTELLE MEMORIAL INST.
804011-010	MP	RESEARCH	ENTOMOLOGICAL SOCIETY OF AMERICA
804016-013	VA	RESEARCH	ST. PAUL'S COLLEGE
804033-012	WA	RESEARCH	WASHINGTON STATE UNIV.
804033-020	WA	RESEARCH	WASHINGTON STATE UNIV.
804102-012	IA	RESEARCH	IOWA STATE UNIV.
804126-010	WA	RESEARCH	WASHINGTON, UNIV. OF
804162-011	CO	RESEARCH	COLORADO SCHOOL OF MINES RES. INST.
804164-010	SC	RESEARCH	CLAFLIN COLLEGE
804168-010	OH	RESEARCH	CHILDREN'S HOSPITAL
804174-010	MI	DEMONSTRATION	FORD MOTOR CO.
804190-010	TX	RESEARCH	TEXAS A&M RES. FDN.
804191-010	FL	DEMONSTRATION	FLORIDA GAME & FRESH WATER FISH COMM.
804200-011	OR	RESEARCH	OREGON STATE UNIV.
804201-010	OH	RESEARCH	OHIO STATE UNIV.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
804204-010	GA	RESEARCH	ATLANTA UNIV. CTR.
804208-010	WA	DEMONSTRATION	SNOWMISH CNTY. METRO. MUN. CORP.
804217-010	RI	RESEARCH	RHODE ISLAND, UNIV. OF
804222-010	WA	DEMONSTRATION	KITSAP CNTY.
804231-010	MI	DEMONSTRATION	FREEBORN CNTY.
804232-010	MI	DEMONSTRATION	INGHAM CNTY. BD. OF COMM.
804233-010	TN	RESEARCH	NASHVILLE THERMAL TRANSFER CORP.
804234-010	WI	DEMONSTRATION	WISCONSIN DEPT. OF NATURAL RESOURCES
804235-010	WI	DEMONSTRATION	WISCONSIN DEPT. OF NATURAL RESOURCES
804237-010	WI	DEMONSTRATION	WISCONSIN DEPT. OF NATURAL RESOURCES
804238-010	WI	DEMONSTRATION	WISCONSIN DEPT. OF NATURAL RESOURCES
804248-010	SD	DEMONSTRATION	EAST DAKOTA CONSERVANCY SUB-DIST.
804250-010	NY	DEMONSTRATION	NEW YORK STATE DEPT. ENVRN. CONSERV.
804251-010	NY	DEMONSTRATION	NEW YORK STATE DEPT. OF ENVRN. CONSERV.
804252-010	NY	DEMONSTRATION	NEW YORK STATE DEPT. OF ENVRN. CONSERV.
804253-010	NY	DEMONSTRATION	NEW YORK STATE DEPT. OF ENVRN. CONSERV.
804254-010	NY	DEMONSTRATION	NEW YORK STATE DEPT. OF ENVRN. CONSERV.
804260-010	MN	DEMONSTRATION	MINNEAPOLIS, CITY OF
804272-010	ME	DEMONSTRATION	MAINE DEPT. OF ENVRN. PROTECTION
804278-010	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
804291-010	MN	RESEARCH	MINNESOTA, UNIV. OF
804293-010	CA	RESEARCH	MONTROSE CHEMICAL CORP.
804294-010	PA	RESEARCH	CUSQUEHANNA UNIV.
804306-010	WI	DEMONSTRATION	SUPERIOR FIBER PRODUCTS, INC
804307-010	MD	RESEARCH	JOHNS HOPKINS UNIV.
804309-010	DC	RESEARCH	ENVIRONMENTAL LAW INSTITUTE
804311-010	NJ	RESEARCH	AMERICAN ELECTROPLATERS' SOCIETY, INC.
804312-010	OH	DEMONSTRATION	CHAMPION INTERNATIONAL
804314-010	TX	RESEARCH	TEXAS A&M UNIV.
804316-010	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804317-010	LA	RESEARCH	GULF SOUTH RES. INST.
804328-011	IN	RESEARCH	PURDUE RES. FDN.
804329-010	NC	RESEARCH	AMERICAN TEXTILE MANUFACTURERS INST.
804329-011	NC	RESEARCH	AMERICAN TEXTILE MANUFACTURERS INST.
804333-010	OH	RESEARCH	OHIO UNIV.
804337-010	IL	RESEARCH	ILLINOIS, UNIV. OF
804341-010	IL	RESEARCH	ILLINOIS, UNIV. OF
804343-010	DC	RESEARCH	NATIONAL COUN. ON RES. IN ENERGY CONS.
804345-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
804348-010	OH	RESEARCH	OHIO STATE UNIV. RES. FDN.
804349-010	NY	RESEARCH	AGWAY INC.
804350-010	MA	DEMONSTRATION	W.R. GRACE & CO.
804351-010	AZ	RESEARCH	ARIZONA, UNIV. OF
804353-010	FL	RESEARCH	MIAMI, UNIV. OF
804353-011	FL	RESEARCH	MIAMI, UNIV. OF
804355-010	FL	RESEARCH	MIAMI, UNIV. OF
804357-010	SC	RESEARCH	CLEMSON UNIV.
804359-010	SC	RESEARCH	SOUTH CAROLINA, UNIV. OF
804360-012	DC	DEMONSTRATION	INTERNATIONAL CITY MANAGEMENT ASSOC.
804361-010	MN	RESEARCH	MINNESOTA, UNIV. OF
804368-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
804367-010	DC	DEMONSTRATION	INSTITUTE OF INDUSTRIAL LAUNDERERS

GRANT NUMBER	STATE	PROGRAM	APPLICANT
804368-010	TX	RESEARCH	SOUTHWEST RES. INST.
804369-010	MI	RESEARCH	MICHIGAN, UNIV. OF
804375-010	FL	RESEARCH	FLORIDA STATE OFFICE OF HEALTH
804376-010	FL	RESEARCH	FLORIDA STATE UNIV.
804377-010	NC	RESEARCH	FELDSPAR CORP.
804381-010	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804385-010	DC	RESEARCH	PUBLIC TECHNOLOGY, INC.
804389-010	DC	RESEARCH	NATIONAL ASSOC. OF COUNTIES
804393-010	WA	RESEARCH	WASHINGTON, UNIV. OF
804394-010	NJ	RESEARCH	RUTGERS UNIV.
804395-010	MO	RESEARCH	WASHINGTON UNIV.
804400-010	DC	RESEARCH	PUBLIC TECHNOLOGY, INC.
804408-011	DC	RESEARCH	PUBLIC TECHNOLOGY, INC.
804401-010	DC	RESEARCH	AMERICAN DEFENSE PREPAREDNESS ASSOC.
804402-010	WI	RESEARCH	WISCONSIN, UNIV. OF
804403-010	IL	RESEARCH	ILLINOIS, UNIV. OF
804404-010	LA	RESEARCH	NEW ORLEANS SEWERAGE & WATER BD.
804407-010	SC	RESEARCH	SOUTH CAROLINA, UNIV. OF
804411-010	DC	RESEARCH	ASSOCIATION OFFICIAL ANALYTICAL CHEMISTS
804416-010	GA	RESEARCH	GEORGIA INST. OF TECH.
804418-010	OH	RESEARCH	CINCINNATI, UNIV. OF
804419-010	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
804421-010	TX	RESEARCH	TEXAS A&M RES. FDN.
804422-010	WA	RESEARCH	SEATTLE CITY WATER DEPT.
804424-010	MI	RESEARCH	MICHIGAN STATE UNIV.
804427-010	OR	RESEARCH	OREGON STATE UNIV.
804428-010	NY	RESEARCH	SYRACUSE UNIV.
804429-010	AR	RESEARCH	ARKANSAS, UNIV. OF
804430-010	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804431-010	CA	RESEARCH	STANFORD UNIV.
804432-010	CA	RESEARCH	SAN JOSE, CITY OF
804433-010	CO	RESEARCH	AMERICAN WATER WORKS ASSOC. RES. FDN.
804435-010	NY	RESEARCH	SLOAN-KETTERING INST. FOR CANCER RES.
804438-010	TN	RESEARCH	VANDERBILT UNIV.
804440-010	GA	RESEARCH	ATLANTA UNIV. CTR.
804442-010	MI	RESEARCH	CRANBROOK INST. OF SCIENCE
804444-010	MO	RESEARCH	MISSOURI, UNIV. OF
804450-010	CA	RESEARCH	TETRA TECH. INC.
804455-010	CA	RESEARCH	NEW JERSEY INST. OF TECH.
804456-010	OR	RESEARCH	OREGON STATE UNIV.
804458-010	FL	RESEARCH	WEST FLORIDA, UNIV. OF
804460-010	OH	RESEARCH	MAHONING CNTY. BD. OF COMM.
804463-010	NY	RESEARCH	INTERSTATE SAN. COMM.
804470-010	GA	RESEARCH	CLARK COLLEGE
804472-010	CO	RESEARCH	COLORADO, UNIV. OF
804477-010	GA	RESEARCH	GEORGIA STATE UNIV.
804495-010	NY	RESEARCH	CORNELL UNIV.
804497-010	LA	RESEARCH	LOUISIANA TECH UNIV.
804501-010	MN	RESEARCH	MINNESOTA, UNIV. OF
804503-010	MI	RESEARCH	MICHIGAN, UNIV. OF
804507-010	OK	RESEARCH	OKLAHOMA, UNIV. OF
804510-010	GA	RESEARCH	GEORGIA, UNIV. OF

GRANT NUMBER	STATE	PROGRAM	APPLICANT
804512-010	MM	RESEARCH	MINNESOTA, UNIV. OF
804513-010	NY	RESEARCH	BOYCE THOMPSON INST.
804514-010	PC	RESEARCH	CONCEPTION UNIV.
804515-010	CO	RESEARCH	IRRIGATION HYDROLOGY CO.
804517-010	MI	RESEARCH	MICHIGAN STATE UNIV.
804519-010	FL	RESEARCH	MIAMI, UNIV. OF
804521-010	FL	RESEARCH	DADE CNTY. DEPT. OF PUBLIC HEALTH
804522-010	MI	RESEARCH	NICHIGAN DEPT. OF NATURAL RESOURCES
804527-010	MS	RESEARCH	SOUTHERN MISSISSIPPI, UNIV. OF
804529-010	DC	RESEARCH	ASSOCIATION OF METRO SEWERAGE AGENCIES
804531-010	AL	RESEARCH	AUBURN UNIV.
804533-010	DC	RESEARCH	SMITHSONIAN INST.
804538-010	IL	RESEARCH	ILLINOIS INST. OF TECH.
804539-010	PC	RESEARCH	INSTITUTE FOR MEDICAL RES.
804541-010	FL	RESEARCH	WEST FLORIDA, UNIV. OF
804544-010	CA	RESEARCH	GOVERNMENTAL REFUSE COLLECTION & DISP.
804546-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
804548-010	OH	RESEARCH	OHIO AGRI. RES. & DEVELOPMENT CTR.
804549-010	TX	RESEARCH	TEXAS, UNIV. OF
804554-010	MA	RESEARCH	ARTHUR D. LITTLE, INC.
804563-010	NY	RESEARCH	MANHATTAN COLLEGE
804565-010	AZ	RESEARCH	ARIZONA, UNIV. OF
804568-010	KY	RESEARCH	KENTUCKY, UNIV. OF
804573-010	NY	RESEARCH	NEW YORK STATE UNIV. RES. FOM.
804578-010	MA	RESEARCH	NORTHEASTERN UNIV.
804586-010	TX	RESEARCH	HOUSTON, UNIV. OF
804593-010	WA	RESEARCH	WASHINGTON, UNIV. OF
804595-010	PC	RESEARCH	ASSOCIAZIONE NAZIONALE DI INGEGNERIA
804598-010	MM	RESEARCH	MONTANA COLLEGE
804608-010	NY	RESEARCH	MINNESOTA STATE DEPT. OF HEALTH
804612-010	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
804616-010	CO	RESEARCH	OHIO STATE UNIV.
804618-010	FL	RESEARCH	COLORADO SCHOOL OF MINES
804629-010	GA	RESEARCH	FLORIDA, UNIV. OF
804642-010	CA	RESEARCH	GEORGIA INST. OF TECH.
804644-010	NY	RESEARCH	STANFORD RESEARCH INST.
804646-010	NY	RESEARCH	NATIONAL COUNCIL OF PAPER IND. FOR AIR
804648-010	NY	RESEARCH	NATIONAL COUNCIL OF PAPER IND. FOR AIR
804694-010	MI	RESEARCH	HOLLEY CARBURATOR
804775-010	NY	RESEARCH	NEW YORK, CITY OF
804785-010	VA	RESEARCH	MINNESOTA, UNIV. OF
804789-010	MD	RESEARCH	RESOURCE RECOVERY STUDY COMM.
804787-010	MI	RESEARCH	MARYLAND ENVRN. SERVICES
804800-010	CA	RESEARCH	DETROIT, CITY OF
804819-010	DC	RESEARCH	STANISLAUS CNTY.
900014-052	MI	TRAINING	PUBLIC INTEREST ECONOMICS CENTER
900053-055	NC	TRAINING	MARQUETTE UNIV.
900065-054	IN	TRAINING	NORTH CAROLINA, UNIV. OF
900069-063	UT	TRAINING	NOTRE DAME, UNIV. OF
900072-081	OR	TRAINING	UTAH STATE UNIV.
900078-064	OK	TRAINING	OREGON STATE UNIV.
			OKLAHOMA STATE UNIV.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
900107-081	SC	TRAINING	TEXAS, UNIV. OF
900115-045	TX	TRAINING	NORTH TEXAS STATE UNIV.
900121-046	MO	TRAINING	MISSOURI, UNIV. OF
900122-082	NC	TRAINING	NORTH CAROLINA, UNIV. OF
900123-062	OH	TRAINING	CINCINNATI, UNIV. OF
900127-081	NY	TRAINING	CORNELL UNIV.
900127-083	NY	TRAINING	CORNELL UNIV.
900129-042	TX	TRAINING	TEXAS A&M UNIV.
900131-062	CA	TRAINING	CALIFORNIA, UNIV. OF
900132-081	OH	TRAINING	TOLEDO, UNIV. OF
900133-083	CA	TRAINING	STANFORD UNIV.
900135-076	CA	TRAINING	STANFORD UNIV.
900146-075	NY	TRAINING	MANHATTAN COLLEGE
900146-076	SC	TRAINING	CLEMSON UNIV.
900152-081	MA	TRAINING	CLEMSON UNIV.
900164-051	WI	TRAINING	TUFTS UNIV.
900175-075	TX	TRAINING	WISCONSIN, UNIV. OF
900176-082	IA	TRAINING	RICE UNIV.
900180-041	MA	TRAINING	IONA STATE UNIV.
900186-051	AZ	TRAINING	NORTHEASTERN UNIV.
900190-056	CA	TRAINING	ARIZONA, UNIV. OF
900198-072	CA	TRAINING	CALIFORNIA, UNIV. OF
900215-016	MI	TRAINING	NEW MEXICO STATE UNIV.
900228-031	OH	TRAINING	MICHIGAN STATE UNIV.
900266-052	CO	TRAINING	CINCINNATI, UNIV. OF
900312-051	IL	TRAINING	COLORADO STATE UNIV.
900313-051	MA	TRAINING	ILLINOIS, UNIV. OF
900314-053	MS	TRAINING	WASHINGTON, UNIV. OF
900331-052	MI	TRAINING	MISSISSIPPI STATE UNIV.
900333-081	VA	TRAINING	MICHIGAN STATE UNIV.
900358-014	VA	TRAINING	VIRGINIA POLY. INST. & STATE UNIV.
900489-012	MO	TRAINING	YENN. DEPT. OF PUBLIC HEALTH
900494-021	CA	TRAINING	WATER & WASTEWATER TECH. SCH.
900500-020	NY	TRAINING	WATER & WASTEWATER TECH. SCH.
900505-030	GA	TRAINING	CALIFORNIA STATE UNIV. FDN.
900507-012	NY	TRAINING	CORNELL UNIV.
900512-013	NY	TRAINING	ATLANTA UNIV. CTR.
900519-016	GA	TRAINING	WATER & WASTEWATER TECH. SCH.
900521-012	TX	TRAINING	ULSTER CNTY. COMMUN. COLLEGE
900530-011	MS	TRAINING	WATER & WASTEWATER TECH. SCH.
900531-020	CA	TRAINING	SAVANNAH STATE COLLEGE
900532-020	OH	TRAINING	TEXAS A&M UNIV.
900534-011	IL	TRAINING	MISSISSIPPI VALLEY STATE UNIV.
900548-012	CO	TRAINING	OREGON MUSEUM OF SCIENCE & INDUSTRY
900558-011	CA	TRAINING	INSTITUTE OF ENVRN. EDUC.
900572-010	PA	TRAINING	SOUTHERN ILLINOIS UNIV.
900574-010	DC	TRAINING	COLORADO STATE UNIV.
900575-010	SC	TRAINING	SOUTHERN CALIFORNIA UNIV. OF
900576-010	SC	TRAINING	AMERICAN LAW INST.
900577-010	NJ	TRAINING	NATIONAL ASSOC. OF CONSERVATION DIST.
			CLEMSON UNIV.
			CLEMSON UNIV.
			NEW JERSEY ENVRN. COMM. ASSOC.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
900578-010	NJ	TRAINING	NEWARK, CITY OF
900579-010	CO	TRAINING	DENVER COMMUN. COLLEGE
900580-010	CT	TRAINING	CONNECTICUT PUBLIC TELEVISION
900581-010	NY	TRAINING	ENVIRONMENTAL ACTION COALITION INC.
900582-010	TX	TRAINING	CENTRAL TEXAS COLLEGE
900583-010	DC	TRAINING	LEAGUE OF WOMEN VOTERS EDUCATION FUND
900586-010	NJ	TRAINING	NEW JERSEY DEPT. OF ENVIRON. PROTECTION
900587-010	VI	TRAINING	VIRGIN ISLANDS, GOVT. OF
900588-010	MA	TRAINING	ACTION FOR BOSTON COMMUN. DEVELOPMENT
900589-010	IA	TRAINING	ASSOCIATION OF BOARDS OF CERTIFICATION
900590-010	VA	TRAINING	NATIONAL RECREATION AND PARK ASSOC.
900591-010	IA	TRAINING	NATIONAL FIELD RESEARCH CENTER INC.
900595-010	DC	TRAINING	LEAGUE OF WOMEN VOTERS EDUCATION FUND
900596-010	PA	TRAINING	PHILADELPHIA, CITY OF
900603-010	DC	TRAINING	ENVIRONMENTAL ACTION FDN.
900604-010	DC	TRAINING	LEAGUE OF WOMEN VOTERS EDUCATION FUND
900607-010	DC	TRAINING	LEAGUE OF CITIES-CONFERENCE OF MAYORS
900609-010	DC	TRAINING	GEORGETOWN UNIV.
900610-010	NY	TRAINING	SCIENTISTS' COMM. FOR PUBLIC INFO.
900613-010	DC	TRAINING	OIL CHEMICAL & ATOMIC WORKERS UNION
900660-011	SC	TRAINING	CLENSON UNIV.
900668-011	MD	TRAINING	MARYLAND, UNIV. OF
910278-012	MA	FELLOWSHIPS	WASHINGTON STATE UNIV.
910381-012	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910382-012	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910386-013	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910387-012	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910388-012	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910391-012	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910393-012	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910395-013	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910397-012	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910421-012	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910428-013	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910429-013	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910430-013	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910507-011	RI	FELLOWSHIPS	BROWN UNIV.
910517-011	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910534-011	WV	FELLOWSHIPS	WEST VIRGINIA COLLEGE OF GRAD STUDIES
910550-011	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
910570-011	PA	FELLOWSHIPS	PITTSBURGH, UNIV. OF
910574-011	IN	FELLOWSHIPS	BALL STATE UNIV.
910581-011	MO	FELLOWSHIPS	WASHINGTON UNIV.
910594-011	CA	FELLOWSHIPS	SOUTHERN CALIFORNIA, UNIV. OF
910602-011	MO	FELLOWSHIPS	WASHINGTON UNIV.
910616-012	UT	FELLOWSHIPS	UTAH STATE UNIV.
910625-010	MA	FELLOWSHIPS	MASSACHUSETTS, UNIV. OF
910631-012	UT	FELLOWSHIPS	UTAH STATE UNIV.
910633-013	UT	FELLOWSHIPS	UTAH STATE UNIV.
910655-011	MO	FELLOWSHIPS	WASHINGTON UNIV.
910662-011	MO	FELLOWSHIPS	WASHINGTON UNIV.
910664-011	MO	FELLOWSHIPS	WASHINGTON UNIV.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
910490-011	DC	FELLOWSHIPS	GEORGE WASHINGTON UNIV.
910705-010	MT	FELLOWSHIPS	MICHIGAN, UNIV. OF
910706-011	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910707-012	WV	FELLOWSHIPS	WEST VIRGINIA COLLEGE GRAD. STUDIES
910708-010	CA	FELLOWSHIPS	SAN DIEGO STATE UNIV.
910709-011	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910710-011	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910711-011	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910712-011	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910714-011	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910715-011	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910716-010	MI	FELLOWSHIPS	MICHIGAN, UNIV. OF
910717-011	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910718-010	MO	FELLOWSHIPS	WASHINGTON UNIV.
910720-010	ME	FELLOWSHIPS	MAINE, UNIV. OF
910722-010	MI	FELLOWSHIPS	MICHIGAN, UNIV. OF
910725-010	WV	FELLOWSHIPS	WEST VIRGINIA COLLEGE GRAD STUDIES
910732-010	VA	FELLOWSHIPS	VIRGINIA, UNIV. OF
910735-010	TN	FELLOWSHIPS	EAST TENNESSEE STATE UNIV.
910738-010	NY	FELLOWSHIPS	COOPER UNION
910739-011	NY	FELLOWSHIPS	COOPER UNION
910739-010	NY	FELLOWSHIPS	COOPER UNION
910740-010	NY	FELLOWSHIPS	COOPER UNION
910740-011	NY	FELLOWSHIPS	COOPER UNION
910743-010	NY	FELLOWSHIPS	COOPER UNION
910743-011	NY	FELLOWSHIPS	COOPER UNION
910744-010	NY	FELLOWSHIPS	COOPER UNION
910744-011	NY	FELLOWSHIPS	COOPER UNION
910745-010	NY	FELLOWSHIPS	COOPER UNION
910745-011	NY	FELLOWSHIPS	COOPER UNION
910746-010	NY	FELLOWSHIPS	COOPER UNION
910746-011	NY	FELLOWSHIPS	COOPER UNION
910748-010	NY	FELLOWSHIPS	COOPER UNION
910748-011	NY	FELLOWSHIPS	COOPER UNION
910749-010	NY	FELLOWSHIPS	COOPER UNION
910749-011	NY	FELLOWSHIPS	COOPER UNION
910750-010	NY	FELLOWSHIPS	COOPER UNION
910750-011	NY	FELLOWSHIPS	COOPER UNION
910752-010	NY	FELLOWSHIPS	COOPER UNION
910752-012	NY	FELLOWSHIPS	COOPER UNION
910753-010	NY	FELLOWSHIPS	COOPER UNION
910753-011	NY	FELLOWSHIPS	COOPER UNION
910754-010	NY	FELLOWSHIPS	COOPER UNION
910754-011	NY	FELLOWSHIPS	COOPER UNION
910755-010	NY	FELLOWSHIPS	COOPER UNION
910755-011	NY	FELLOWSHIPS	COOPER UNION
910756-010	NY	FELLOWSHIPS	COOPER UNION
910756-011	NY	FELLOWSHIPS	COOPER UNION
910757-010	NY	FELLOWSHIPS	COOPER UNION
910757-011	NY	FELLOWSHIPS	COOPER UNION
910758-010	NY	FELLOWSHIPS	COOPER UNION

GRANT NUMBER	STATE	PROGRAM	APPLICANT
910758-011	NY	FELLOWSHIPS	COOPER UNION
910759-010	NY	FELLOWSHIPS	COOPER UNION
910759-011	NY	FELLOWSHIPS	COOPER UNION
910760-010	NY	FELLOWSHIPS	COOPER UNION
910761-010	NY	FELLOWSHIPS	COOPER UNION
910761-011	NY	FELLOWSHIPS	COOPER UNION
910762-010	NY	FELLOWSHIPS	COOPER UNION
910762-011	NY	FELLOWSHIPS	COOPER UNION
910763-010	NY	FELLOWSHIPS	COOPER UNION
910763-011	NY	FELLOWSHIPS	COOPER UNION
910764-010	NY	FELLOWSHIPS	COOPER UNION
910764-011	NY	FELLOWSHIPS	COOPER UNION
910765-010	NY	FELLOWSHIPS	COOPER UNION
910765-011	NY	FELLOWSHIPS	COOPER UNION
910766-010	NY	FELLOWSHIPS	COOPER UNION
910767-010	NY	FELLOWSHIPS	COOPER UNION
910768-010	OH	FELLOWSHIPS	OHIO STATE UNIV.
910769-010	HI	FELLOWSHIPS	HAWAII, UNIV. OF
910773-010	PA	FELLOWSHIPS	DREXEL UNIV.
910775-010	NY	FELLOWSHIPS	COOPER UNION
910775-011	NY	FELLOWSHIPS	COOPER UNION
910776-010	CA	FELLOWSHIPS	CALIFORNIA, UNIV. OF
910777-010	CA	FELLOWSHIPS	CALIFORNIA, UNIV. OF
910778-010	CA	FELLOWSHIPS	CALIFORNIA STATE UNIV.
910778-011	CA	FELLOWSHIPS	CALIFORNIA STATE UNIV.
910779-010	CA	FELLOWSHIPS	SANTA CLARA, UNIV. OF
910780-010	NY	FELLOWSHIPS	COOPER UNION
910780-011	NY	FELLOWSHIPS	COOPER UNION
910781-010	CA	FELLOWSHIPS	SOUTHERN CALIFORNIA, UNIV. OF
910782-010	CA	FELLOWSHIPS	CALIFORNIA STATE COLLEGE
910783-010	MI	FELLOWSHIPS	MICHIGAN, UNIV. OF
910784-010	IA	FELLOWSHIPS	IOWA STATE UNIV.
910785-010	NY	FELLOWSHIPS	CORNELL UNIV. LAW SCH.
910788-010	TN	FELLOWSHIPS	EAST TENNESSEE STATE UNIV.
910791-010	CA	FELLOWSHIPS	CALIFORNIA, UNIV. OF
910792-010	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910794-010	MA	FELLOWSHIPS	HARVARD UNIV.
910795-010	MA	FELLOWSHIPS	HARVARD UNIV.
910796-010	WI	FELLOWSHIPS	WISCONSIN, UNIV. OF
910799-010	PA	FELLOWSHIPS	DUQUESNE UNIV.
910800-010	WA	FELLOWSHIPS	WASHINGTON STATE UNIV.
910801-010	AL	FELLOWSHIPS	ALABAMA, UNIV. OF
910803-010	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
910804-010	IL	FELLOWSHIPS	ILLINOIS, UNIV. OF
910805-010	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
910806-010	MA	FELLOWSHIPS	HARVARD UNIV.
910807-010	NY	FELLOWSHIPS	COOPER UNION
910809-010	FL	FELLOWSHIPS	FLORIDA, UNIV. OF
910810-010	NB	FELLOWSHIPS	NEBRASKA, UNIV. OF
910811-010	UT	FELLOWSHIPS	UTAH, UNIV. OF
910813-010	NY	FELLOWSHIPS	RENSSELAER POLYTECHNIC INST.
910814-010	IL	FELLOWSHIPS	ILLINOIS, UNIV. OF

GRANT NUMBER	STATE	PROGRAM	APPLICANT
910816-010	FL	FELLOWSHIPS	FLORIDA, UNIV. OF
910817-010	CA	FELLOWSHIPS	ANTIOCH COLLEGE
910818-010	FL	FELLOWSHIPS	FLORIDA, UNIV. OF
910819-010	DR	FELLOWSHIPS	PORTLAND STATE UNIV.
910824-010	CA	FELLOWSHIPS	SOUTHERN CALIFORNIA, UNIV. OF
910825-010	MA	FELLOWSHIPS	HARVARD UNIV.
910828-010	CO	FELLOWSHIPS	COLORADO STATE UNIV.
910829-010	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910830-010	NY	FELLOWSHIPS	NEW YORK POLYTECHNIC INST.
910831-010	NY	FELLOWSHIPS	RENSSELAER POLYTECHNIC INST.
910833-010	CT	FELLOWSHIPS	CONNECTICUT, UNIV. OF
910833-011	CT	FELLOWSHIPS	CONNECTICUT, UNIV. OF
910834-010	MA	FELLOWSHIPS	HARVARD UNIV.
910835-010	NY	FELLOWSHIPS	NEW YORK, UNIV. OF
910836-010	WV	FELLOWSHIPS	WEST VIRGINIA, UNIV. OF
910839-010	CT	FELLOWSHIPS	NEW HAVEN, UNIV. OF
910844-010	NY	FELLOWSHIPS	NEW YORK STATE UNIV./EMPIRE COLLEGE
910845-010	NC	FELLOWSHIPS	NORTH CAROLINA STATE UNIV.
910848-010	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
910849-010	MA	FELLOWSHIPS	HARVARD UNIV.
910850-010	CA	FELLOWSHIPS	CALIFORNIA, UNIV. OF
910853-010	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910854-010	CT	FELLOWSHIPS	NEW HAVEN, UNIV. OF
910855-010	NY	FELLOWSHIPS	MANHATTAN COLLEGE
910856-010	OK	FELLOWSHIPS	OKLAHOMA STATE UNIV.
910857-010	PA	FELLOWSHIPS	PENNSYLVANIA STATE UNIV.
910858-010	NY	FELLOWSHIPS	CORNELL UNIV.
910859-010	AZ	FELLOWSHIPS	ARIZONA STATE UNIV.
910861-010	NC	FELLOWSHIPS	NORTH CAROLINA, UNIV. OF
910863-010	IL	FELLOWSHIPS	ILLINOIS, UNIV. OF
910864-010	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910865-010	UT	FELLOWSHIPS	UTAH STATE UNIV.
910866-010	UT	FELLOWSHIPS	UTAH STATE UNIV.
910867-010	SD	FELLOWSHIPS	SOUTH DAKOTA STATE UNIV.
910868-010	UT	FELLOWSHIPS	UTAH STATE UNIV.
910869-010	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910870-010	DC	FELLOWSHIPS	GEORGE WASHINGTON UNIV.
910871-010	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910872-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
910873-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
910875-010	TC	FELLOWSHIPS	GEORGE WASHINGTON UNIV.
910876-010	WI	FELLOWSHIPS	WISCONSIN, UNIV. OF
910877-010	CA	FELLOWSHIPS	STANFORD UNIV.
910879-010	MA	FELLOWSHIPS	TUFTS UNIV.
910881-010	UT	FELLOWSHIPS	UTAH STATE UNIV.
910882-010	CA	FELLOWSHIPS	SAN JOSE STATE UNIV.
910884-010	CA	FELLOWSHIPS	HEALD ENGINEERING COLLEGE
910887-010	NY	FELLOWSHIPS	NEW YORK POLYTECHNIC INST.
910888-010	MS	FELLOWSHIPS	MISSISSIPPI STATE UNIV.
910889-010	CO	FELLOWSHIPS	COLORADO STATE UNIV.
910890-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
910891-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF

GRANT NUMBER	STATE	PROGRAM	APPLICANT
910892-010	FL	FELLOWSHIPS	FLORIDA STATE UNIV.
910892-011	FL	FELLOWSHIPS	FLORIDA STATE UNIV.
910893-010	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
910894-010	WI	FELLOWSHIPS	WISCONSIN, UNIV. OF
910895-010	WI	FELLOWSHIPS	WISCONSIN, UNIV. OF
910895-011	WI	FELLOWSHIPS	WISCONSIN, UNIV. OF
910896-010	WI	FELLOWSHIPS	WISCONSIN, UNIV. OF
910897-010	SC	FELLOWSHIPS	CLEMSON UNIV.
910898-010	MA	FELLOWSHIPS	HARVARD UNIV.
910899-010	OH	FELLOWSHIPS	CASE WESTERN RESERVE UNIV.
910900-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
910901-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
910903-010	CA	FELLOWSHIPS	CALIFORNIA STATE UNIV.
910904-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
910905-010	DC	FELLOWSHIPS	GEORGE WASHINGTON UNIV.
910907-010	UT	FELLOWSHIPS	UTAH STATE UNIV.
910908-010	NY	FELLOWSHIPS	RENSSELAER POLYTECHNIC INST.
910909-010	VA	FELLOWSHIPS	VIRGINIA INST. OF MARINE SCIENCE
910910-010	TX	FELLOWSHIPS	ST. MARY UNIV.
910913-010	HI	FELLOWSHIPS	HAWAII, UNIV. OF
910914-010	NY	FELLOWSHIPS	MANHATTAN COLLEGE
910915-010	PA	FELLOWSHIPS	DREXEL UNIV.
910916-010	VA	FELLOWSHIPS	VIRGINIA POLYTECHNIC INST. & STATE UNIV.
910917-010	MD	FELLOWSHIPS	JOHN HOPKINS UNIV.
910918-010	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910919-010	MT	FELLOWSHIPS	MONTANA, UNIV. OF
910921-010	CA	FELLOWSHIPS	CALIFORNIA, UNIV. OF
910923-010	RI	FELLOWSHIPS	RHODE ISLAND, UNIV. OF
910926-010	CA	FELLOWSHIPS	CALIFORNIA STATE UNIV.
910927-010	NM	FELLOWSHIPS	NEW MEXICO STATE UNIV.
910928-010	IN	FELLOWSHIPS	PURDUE UNIV.
910929-010	OK	FELLOWSHIPS	OKLAHOMA, UNIV. OF
910930-010	CA	FELLOWSHIPS	CALIFORNIA STATE COLLEGE
910931-010	CA	FELLOWSHIPS	CALIFORNIA STATE COLLEGE
910932-010	CA	FELLOWSHIPS	CALIFORNIA STATE COLLEGE
910933-010	NY	FELLOWSHIPS	RENSSELAER POLYTECHNIC INST.
910936-010	UT	FELLOWSHIPS	UTAH STATE UNIV.
910939-010	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
910940-010	HI	FELLOWSHIPS	HAWAII, UNIV. OF
910946-010	MD	FELLOWSHIPS	JOHNS HOPKINS UNIV.
910947-010	NY	FELLOWSHIPS	NEW YORK POLYTECHNIC INST.
910948-010	MD	FELLOWSHIPS	JOHN HOPKINS UNIV.
910949-010	TX	FELLOWSHIPS	HOUSTON, UNIV. OF
910950-010	TX	FELLOWSHIPS	HOUSTON, UNIV. OF
910953-010	FL	FELLOWSHIPS	FLORIDA STATE UNIV.
910954-010	NY	FELLOWSHIPS	NEW YORK, UNIV. OF
910955-010	TN	FELLOWSHIPS	EAST TENNESSEE STATE UNIV.
910956-010	OK	FELLOWSHIPS	OKLAHOMA, UNIV. OF
910957-010	WA	FELLOWSHIPS	WESTERN WASHINGTON STATE COLLEGE

The objective of this investigation is to detect the presence of carcinogens or potential carcinogens in municipal water supplies and sources, utilizing bacterial and mammalian cell monitors. Studies have indicated that histidine-dependent mutant strains of Salmonella typhimurium and the mouse embryo cell line R846 DP8 would be suitable for this purpose. Investigations have shown that the use of both the direct and liver enzyme-activated testing methods are advantageous when the bacterial tester strains are employed. To complement these findings, studies will be conducted on the efficacy of employing an embryonic hamster cell line for assay.

Samples of Mississippi River water collected at different locations, ranging from St. Francisville, La. to Pointe a la Hache, La., were assayed with the bacterial test system, using the direct and liver enzyme-activated testing methods. The data showed that the majority of the water samples produced significant rates of reversion with one or more of the tester strains. In a number of instances, metabolic activation was necessary before the strains were reverted.

When tested with the R846 DP8 cell system, 5 of 22 river water samples produced cell transformation. Four of these 5 samples were found to have produced significant rates of reversion with the bacterial system.

R800362 04

1) Documentation of the multiphase distribution of CH* in selected regions of Puget Sound, 2) identification of the main input sources 3) characterization of the transport mechanism within the ecosystem by correlation analyses involving general water circulation and mass transport, 4) assessment of the phase amplification in this eutrophic estuary by determination of CH mass partition coefficients and comparison with the values determined in coastal zones and oligotrophic regions 5) establishment of critical accumulation levels and toxicity thresholds for representative planktonic species of major abundance in Puget Sound by batch and continuous culture techniques under environmental conditions similar to those encountered in this region and 6) modification of existing simulation models to accommodate additional equations for the representation of the CH distribution in terms of the input and loss rates of the specific phases examined.

*Chlorinated hydrocarbon

The Select Research Group (SRG) is developing a comprehensive air pollution model designed to enable a control agency to relate air pollution sources to their subsequent distribution in an urban or regional environment. Because progress towards the principal objective requires a broad interdisciplinary effort, the research program has been organized around several integrated subtasks. These include: development of a hydrodynamic model for predicting on a regional basis atmospheric winds and other air pollution-influencing meteorological variables; studies of techniques for modeling atmospheric processes which occur on scales smaller than those evaluated directly by the regional model; development of a closure scheme for the prediction of turbulent fluxes of pollutants; improvement of techniques for remotely sensing and directly measuring meteorological and air pollution parameters in order that the performance of the regional model can be adequately tested and evaluated; studies of the meteorological effects on the properties of air pollutants and pollutant-pollutant interactions; and studies of the removal of air pollutants at the earth's surface.

Significant research completed during the first year of the SRG program included: Completion of coding and initiation of testing of the regional numerical model, development and testing of a comprehensive meteorological-air pollution aircraft measurement system, and the design and initial testing of an acoustic sounding system. Aerosol studies have focused on the development and integration of measurement techniques suitable for determining the temporal and spatial variations of both non-hygroscopic and hygroscopic particulates. Special urban, city and rural measurements of atmospheric aerosol using both surface and airborne techniques have been conducted and are being analyzed.

R800875 05

The Department of Atmospheric Resources, College of Engineering of Wyoming, initiated a field program within the Greater St. Louis area (Project METROMEX) during August 1971 and continued these research operations through Augusts 1972-73. Project METROMEX is a cooperative field program with the Argonne National Laboratories, Battelle Northwest Laboratories, University of Chicago, Illinois State Water Survey and Stanford Research Institute.

In order to align our EPA-sponsored research with the objectives of the Regional Air Pollution Study (RAPS), we are investigating the meso-scale dynamical and thermodynamical processes in the urban environment to:

- 1) observe and analyze the kinematics of the general meso-scale motions;
- 2) investigate the temporal and spatial variations of the static meteorological parameters (e.e., temperature, pressure moisture) in the urban environment and relate the observed air mass modification to energy, moisture, and aerosol (Aitken nuclei) budgets in the urban atmosphere;
- 3) investigate the mixing processes associated with the urban modification of the atmospheric environment; and
- 4) observe and analyze the character and modifications and the initial stages of growing cumulus clouds due to the meso-scale influences (heat, moisture and aerosol ingestions) of the urban area.

The research program at the UNC outdoor smog chamber for the period of 1975-1976-1977 will concentrate on experimental simulations of control strategies for ozone (O_3). Experimental runs will, in stages of increasing complexity, simulate the chemical and physical processes that might be typical of a moving air parcel in the Los Angeles basin. The light intensity (natural solar radiation), air temperature, and relative humidity used in the simulation will be the ambient conditions existing at the time of a run. Injected material will consist of various combinations of nitric oxide (NO), nitrogen dioxide (NO_2), O_3 , and a variety of hydrocarbons to include propylene (C_3H_6) only, simple mixtures of C_3H_6 , butane (C_4H_{10}), and ethylene (C_2H_2), the previous urban hydrocarbon mix (13 or more compounds), and, if necessary, a more complex mix based on Mayrsohn's recent findings (1975) which would be composed of an auto exhaust fraction, a gasoline fraction, an evaporative emissions fraction and three types of natural gas fractions. In selected cases, the effects of mixing "old" air containing aldehydes and O_3 with the fresh reaction mixture will be examined. One or more Los Angeles Reactive Pollutant Program operations will be simulated in the outdoor chamber as a means of validating the chamber performance.

The major objective of this project is to understand the defense mechanisms of animals to pesticidal chemicals. The compounds which are important from the viewpoint of environmental contamination are the primary target of this research project. Efforts will be made to study the biochemical mechanisms by which organophosphate, carbamate and other insecticidal chemicals affect living tissues. Specific projects proposed are (1) to study the glutathione dependent dealkylating and dearylating systems in various animals from a comparative biochemical standpoint. (2) to study the role of mixed-function oxidase systems, (3) to study and classify various esterases degrading organophosphate and carbamate esters, and (4) to study various conjugation enzymes in animals.

The overall aim is to study various target systems and defense mechanisms of animals, by biochemically characterizing each factor through isolation purification, differential inhibition and comparison of substrate spectra.

R801301 05

The project during the coming year will involve measuring the efficiency of air sampling filter media, the study of the mechanics of aerosol sampling and transport, and the further development of techniques and apparatus for generating monodisperse aerosol standards and the application of these standards to the calibration and the study of aerosol measuring instruments.

Progress to date: Efficiency of Teflon membrane filters of 0.5, 1, 5, and 10 μ m diameter pores and Nuclepore filters of 0.6, 1, 3, 5, and 8 μ m pores has been measured in the aerosol diameter range between 0.03 and 1 μ m at filter pressure drops of 1 to 30 cm Hg. The Teflon membrane filter was found to be considerably more efficient than Nuclepore filter of the same or a comparable filter pore size. Monodisperse aerosol generators based on the vibrating orifice and electrostatic classification principles have been developed. Optical particle counters have been studied using monodisperse aerosols of 1.4, 1.5 and 1.6 refractive index. The electrocal aerosol analyzer has been calibrated.

R 801950 03

The correlatability of phages with enteric viruses of human origin and with fecal organisms in waste and other waters will be determined.

The comparative effectiveness of membrane absorption, ultrafiltration, and direct inoculation technics for recovery of viruses from waste and other waters will be evaluated.

The objective of the program of work is to study the effect of microchemicals on community structure and function. The rationale for the investigations is that trace materials may exert selective pressures on species within the community, thereby altering species composition and pathways and efficiency of energy transfer. Nitrilotriacetic acid (NTA) and organic substances from rural watersheds or produced by bacteria have been proposed for study with particular emphasis in future work in the development of nuisance growths of the alga, *Cladophora glomerata*. Gas chromatographic procedures permitting detection of 0.010 mg/l NTA have been adapted for routine use. Alteration of algal community structure has been observed at 200 mg/l, a level far exceeding the concentrations of NTA expected in natural environments (0.02-2.0 mg/l). At 20 mg/l slight shifts in diatom species composition and reduction of biomass production were observed, but this was not evident at 2.0 mg/l. Approximately 2.0 mg/l NTA mitigated the toxic effects of Cu at 100 ug/l on algal communities and the NTA chelates protected bacterial glucose metabolism from the toxic effects of free Cd, Cu and Zn ions. Under aerobic conditions, an NTA degrading bacterial flora developed at different seasons of year. Degradation rate was dependent on temperature and concentration of NTA exposure. Mineralization of dissolved organic matter by bacteria does not seem to be affected by NTA. Concentrations of 10^{-3} M. NTA solubilized metals (Fe, Mn, Cu, Zn) from natural sediments, 10^{-5} M. Solubilized only Zn and 10^{-7} M. appeared to have no effect. Experiments to determine the fate of Cu in the presence and absence of NTA are planned and will be conducted in ecosystem streams containing diverse communities.

1) The main intention is the investigation of physical properties of aerosols and the development of instruments for sizing, counting and classifying aerosol particles in the size range down to .05 micron.

2.1) Construction of a diffusion battery, as an analyzing system for particle size distributions and for investigation of diffusion coefficients at low temperatures.

2.2) Development of an impactor jet system for the measurement of particle size distributions; particles in a specific trajectory of the air stream will be detected by light scattering techniques.

3.1) Diffusion battery. The NaCl-generator, a furnace operating at temperatures around 700°C, has been successfully remodeled. The generator produces monodispersed aerosols beyond 0.2 μ m in diameter. The diffusion battery has been tested with 0.4 μ m-aerosols with encouraging results. Further tests are planned with aerosols of sizes between 0.2 μ m and 0.5 μ m. Special regard will be paid to the comparison of the size by diffusion to the aerodynamic size of the aerosols. Finally, some of these experiments will be repeated at low temperatures.

3.2) The impactor system has been redesigned. A part of the system is a special optical particle counter with a 4 π -counting geometry. With the first model latex particles of 0.35 μ m could be detected. The development of an improved model is planned, in order to lower the detection limit to 0.2 μ m. The impactor stage, which will be operated on line with the counter, has been set up by the end of the year. Its investigation will be a main task for the next period.

Metabolites formed by animals and plants exposed to radioactive carbamate insecticides will be identified or characterized according to their general nature such as "free", "conjugated" and "bound". Individual metabolites or groups (for example, bound metabolites) will be generated in quantities sufficient for studying their fate in animals. Of primary concern will be rates of metabolite degradation, sites and levels of storage of the metabolites and their degradation products in the body, and the rates and nature of the radiocarbon eliminated in the urine and feces. Attempts will be made to synthesize metabolites containing the carbamic acid ester and the toxicity studied; conjugated carbamate metabolites, when successfully synthesized, will be evaluated for their potential toxicological significance.

The objectives of this project are: (1) to establish sensitive criteria to distinguish between hydrocarbons derived from living organisms and those from pollution, (2) to study the persistence and accumulation by marine organisms, especially human food, of objectionable and hazardous compounds derived from pollution, and (3) the extent to which marine pollution interferes with the natural compounds in the sea in the ecological role, and the concentrations which are harmful.

R802160 04

Objective - The goal of this research is to develop experimental and theoretical methods for relating the properties of the pollution aerosol to the characteristics of emission sources.

Approach - This will be accomplished by starting from the observed chemical and physical characteristics of the pollution aerosol and testing certain hypotheses for the atmospheric changes which occur in the size distribution and chemical composition.

Progress and Plans - Chief among the atmospheric changes are the growth processes resulting from gas-to-particle conversion of organic vapors, SO_2 and NO_2 . By laboratory experiments with atmospheric air samples, data are being obtained on particle growth rates as a function of particle size. At the same time gas-to-particle conversion rates are being measured by chemical analysis. It is also proposed to initiate a separate set of studies on the deposition of aerosols in models of the human lung. The goal will be to estimate rate of deposition of various chemical species present in the pollution aerosol at points of high deposition intensity.

R802288 03

There are three main objectives of this work. First, the measurement of rate constants involving alkoxy radicals; second, the characterization of the mechanism of ozonolysis; and third, to provide a critical overview of rate data for modeling purposes.

The approach to the first two objectives is experimental, making use of the VLPP technique; the third objective is approached by critical analysis within the framework of transition state theory.

Current plans are to continue pursuit of methoxy radicals and to confirm our findings on the high rate of reaction of alkoxy radicals with NO and NO_2 .

We will also attempt to isolate the expected intermediate in ozonolysis, the Criegee Zwitterion (or biradical).

Evaluation of rate data is an ongoing project.

A three year study is in progress to research and demonstrate the feasibility of replacing/utilizing an aerobic cell in an anaerobic - aerobic two cell system with overland spray systems for animal waste disposal. This study will determine the influence of spray intervals on receiving capacity of the overland spray area as related to various volumes of waste water usage, extent of waste water improvement, response of model crop plants to animal waste water and of nitrate, total nitrogen, copper and phosphate build-up in the test area and soil perfusion from continued waste.

An underground sprinkler control system has been installed and automated for timing according to treatment. Preliminary sampling and analyses of test plots has been partially accomplished.

Appropriate analysis of variance of the results from completely randomized plots will be used to test the validity of soil and soil water variables of the experiment.

R 802 411

The Storm Water Management Model (SWMM) has proven itself to be a useful computer simulation tool for studies of pollution caused by storm and combined sewer overflows. However, documentation of model usage lacks a clear, concise, logical sequence for users to follow. An extensive effort will be made to revise the present User's Manual to correct for this defect and others and to completely update the model. In addition, refinements will be added to flow routing procedures to account better for backwater, interconnections and surcharging. Treatment and solids handling alternatives other than those presently considered in the SEMM will be examined for application to pollution control. Finally, planning guidelines will be prepared for use by those charged with obtaining least cost, yet environmentally sound solutions to urban drainage and pollution problems. These guidelines will include the results of all available research.

R 802 472

The purpose of this grant is to develop a large outdoor aerosol generation and growth facility to be used for studies in aerosol chemistry and physics. A research program will be conducted to measure the rate of sulfate aerosol formation in hydrocarbon-NO_x systems and metal oxide systems that simulate reacting plumes.

R802511 03

Devices will be developed through the engineering phase and field tested at actual sites to provide early warning of potential failures of dikes and impoundments, which are common causes of hazardous material spillages. The operational principle is the piezoelectric transducing of acoustical emissions in soil--due to release of frictional and cohesive energy--into electrical signals that give signatures for marginal and close-to-failure dikes. The present system will be improved by adding electrical filters and will be further field tested at actual impoundments.

R802516 04

The overall objective is to investigate the propagation of a nuclear polyhedrosis virus from the alfalfa looper in an *in vitro* cultured insect cell line from the cabbage looper. We will manipulate cells and virus to obtain maximum yield of virus from the cells. The cabbage looper cells will be mass propagated with growth rates and maximum densities equal to, or better than, our currently used small volume cultures. Virus will be produced in mass propagated cells. The viral products from mass produced cells will be assayed in the laboratory for pathogenicity to insect hosts as techniques are developed and virus is produced. During the last six months of the grant period, the virus will be tested for efficacy under simulated field conditions.

Initially, cells grown in suspension did not reach as high a cell density as those in stationary flasks. In studies to determine optimum conditions in suspension, we have regulated O₂ tension and medium pH. Anticlumping and antifoaming additives have also been evaluated. By controlling these culture parameters we have succeeded in obtaining rapid growth in suspension cultures. Cells have been grown in 3 liter volumes in fermentors and in continuous culture. The continuous culture system provides a constant supply of cells for replication of virus.

Cultures of various cell densities were infected with different multiplicities of infection to determine the minimum number of pfu necessary to initiate a high yield of virus inclusion bodies. Cultures of about 4×10^6 cells/ml exposed to 1 pfu/cell were the most efficient for virus production. Costs have been lowered by eliminating or reducing medium ingredients.

R802543

The proposed research will be conducted on Lake Erie to determine the effectiveness of Federal, State and local nutrient control programs in reducing the over-enrichment of this important body of water. The prime objective of this research will be the development of a system of indicators which will index the state of eutrophication in the lake as a function of time. This objective will be approached through a series of repetitive field surveys in the western and central basins of Lake Erie to monitor the physiochemical properties of the water and various trophic levels in the lake ecosystem. Field investigations will consist of seven (7) cruises each with 50 stations. Parameters to be measured include: (1) benthic populations, (2) planktonic populations, (3) primary productivity, (4) microbial activity (methane generation), (5) dissolved oxygen, (6) temperature, (7) alkalinity, (8) conductivity, (9) nutrient chemistry, and (10) transparency. Research will begin in July 1973 and will extend for a three year period.

R802547 04 0

The work deals with two crop ecosystems - corn and vegetables. Information sought includes distribution, life history, behavior, and host range of certain soil arthropods; study of impact of cultural practices and selected edaphic factors on soil arthropods; development of life mortality tables; determination of economic damage thresholds; use of insecticides as a complement to pest management systems for soil arthropods and maintenance of a literature reference file.

S 802 651

Provide for additional work including a concerted effort directed at improving the parameters affecting strength improvement of impregnated non-reinforced concrete pipe.

R802656

Our primary objective is to provide baseline information on the metal levels (Ag, Cd, Co, Cu, Fe, Ni, Pb, and Zn) in commercial and other biota from four midcoastal Maine areas. The major study areas are: (1) Western Muscongus Bay (low metals background); (2) St. George River (mineralized, unmined); (3) Cape Rosier (recent open pit mining); and (4) Blue Hill (current underground mining). Thus, we are comparing metal concentrations in marine plants and animals from mineralized and low mineral areas and also from mineralized stations which are near current, recent, or no metal mining operations. Total levels of the above metals are measured in surface sediments. Deep sediment cores and water samples will be collected at high metal level stations.

Samples include filter feeders, deposit feeders, carnivores, omnivores, plus plants. Intertidal and subtidal collections are made in the spring and fall. Water and sediments are collected in nonmetallic samplers.

Individual rather than composite samples of whole animals and plants are analyzed when practicable. Marine worms are allowed to purge of gut contents before analysis. Biological and sediment metals are solubilized by wet ashing (Concentrated nitric acid) procedures. Dissolved metals in water samples are preconcentrated by solvent extraction (APDC/MIBK); some elements will be analyzed directly with a graphite furnace. Standard atomic absorption techniques will be used for estimating total metal values.

R802687 02

The objective of this research program is to investigate the potential role of gas-solid interactions in polluted atmospheres. Currently the primary emphasis of the program involves studies of SO_2 -solid interactions, particularly in the presence of moisture and ammonia. Experimental results, in conjunction with existing theoretical models will be used to assess the atmospheric significance of these heterogeneous reactions.

The approach used in this program is to measure reaction rates and gaseous and adsorbed reaction products for SO_2 reactions taking place on selected solid particles. Solids are chosen for study on the basis of their abundance in polluted atmospheres, including aerosols and ground level surface materials. Additional criteria for selection of solids for study is known catalytic activity as indicated by work reported in the catalyst literature.

Current plans are to continue work in progress on gas-solid interactions of SO_2 . Experiments conducted with 0.0005-0.005 millibars of SO_2 indicate reaction efficiencies (the fraction of SO_2 -solid collisions leading to removal of SO_2) of $\sim 3 \times 10^{-4}$ for Al_2O_3 and MnO_2 , and $\sim 5 \times 10^{-5}$ for fly ash and charcoal. Atmospheric projection of these reaction rates suggest lifetimes of $\sim 1 - 10$ hr for SO_2 removal by airborne solids. Similar reactivities are observed in the presence (50 percent relative humidity) or absence of moisture. These studies are being expanded to include a broader range of materials and relative humidities.

Further modifications of the mass spectrometer system used for analysis are in progress. We anticipate that these modifications will improve our sensitivity for SO_2 by almost an order of magnitude. Plans are currently underway to introduce ammonia into reaction mixtures at concentrations comparable to SO_2 .

The principal objectives of the project are:

- a. Examine the effectiveness of measuring a limited number of parameters to evaluate the processes of eutrophication of a large lake.
- b. Ascertain the eutrophic stage of the Eastern Basin of Lake Erie, as well as an ecological baseline for evaluating the effectiveness of pollution abatement programs.
- c. Evaluate the nature and extent of problems associated with over-enrichment as well as the effectiveness of pollution abatement programs on a large lake.
- d. Provide aquatic transportation and technical aid to the Ohio State University which proposes to do a similar survey in the Central and Eastern Basins.

R802736 03

Quantitative studies will be conducted to further develop and improve methods for the efficient detection of small quantities of enteric viruses in large volumes of (a) potable waters, (b) waters from advanced waste treatment and wastewater reclamation facilities, and (c) estuarine and marine waters. These methods will then be applied in field studies on the occurrence, distribution and survival of enteric viruses in these waters.

The development and application of these improved methods for quantitative virus detection in potable, reclaimed and coastal waters should provide valuable and necessary information for evaluating the potential public health hazard of waterborne enteric viruses.

In our studies on this project to date, we have been developing methodology and portable equipment for detecting small quantities of enteric viruses in large volumes of a variety of waters. In the proposed continuation of these studies, we will emphasize the further development and improvement of virus concentration methods for large volumes of potable water, reclaimed wastewater and natural coastal waters.

The proposed research program is to apply mathematical methods to monoenergetic photon excitation, energy dispersive X-ray fluorescence analyzers in the elemental analyses of particulates on filter paper. The major objective is to automate this method of analysis as much as possible. To accomplish this, five individual objectives can be identified. These are: (1) Obtain or develop if necessary the standard computer programs required to: (a) gain shift spectra to obtain a standard pulse-height calibration and (b) to identify characteristic X-ray energies; (2) Develop the least-squares matrix approach for determining X-ray intensities from pulse-height spectra; (3) Develop the mathematical models necessary to determine elemental compositions from X-ray intensities; (4) Develop the computer software and data handling techniques necessary to implement the methods described; (5) Demonstrate the computer automation on a prototype X-ray analyzer. Objectives 1, 2, and 3 have essentially been accomplished. The major portion of the work during the present period will be devoted to Objectives 4 and 5.

Previous work of our group has demonstrated that naturally-occurring macromolecular compounds, such as those occurring in citrus fruits and marine algae, are capable of binding certain heavy metals, such as lead and cadmium in the gastrointestinal tract. The objective of the current project is to contribute information in order to determine whether the differences in blood lead levels observed in various population groups in states, such as California, Ohio and New York, could be due to increased binding of lead by citrus fruit products. The extent of binding of lead in the gastrointestinal tract and the differential between lead and calcium binding will be studied in vitro and in vivo using ligated segment technique. Studies of morphological characteristics of metal-macromolecular complexes by stereochemistry and electronmicroscopy will be carried out with the specific objective of determining the nature of metal-macromolecular binding reaction.

R802839030

An area of great concern in environmentally related research is the consideration of multifactorial determinants of human lung cancer. Animal models for induction of pulmonary neoplasia have employed both intratracheal instillations and inhalational exposure to a variety of organic or inorganic agents, alone or in combinations. Exposures to combinations of agents have been productive of large amounts of important data, but have in addition raised vital questions relevant to many environmental contaminants. Data already available from animal exposures have been useful in postulating pathogenic mechanisms as well as in elucidating specific human health hazards.

Presently, policy making and regulatory agencies are confronted with need for data relevant to the potential health effects of exposure to airborne particulate sulfates. The proposed research will evaluate the role of these airborne particulates on the development of pulmonary neoplasia following exposure of Syrian Golden Hamsters to the ubiquitous hydrocarbon carcinogen, benzo(a)pyrene. This investigation will combine exposure to aerosols of particulate sulfate with an intratracheally administered suspension of benzo(a)pyrene. The end point to be evaluated following the period of daily aerosol and weekly intratracheal exposures will be the frequency of development and morphologic characterization of respiratory tract neoplasms in animals maintained for their natural life-time. The studies include use of radiolabeled airborne particles to evaluate the deposition and clearance of sulfate in the animal respiratory tract, and studies to evaluate pulmonary defense mechanisms operative in this model system.

R802913 03

The nuclear technique of proton scattering will be developed into a broad range quantitative analysis method for air particulate matter for all elements up to potassium. Data acquisition and data evaluation times as short as 5 minutes are an objective. Proton scattering spectra and cross sections have been determined using 16 MeV protons from a Tandem Van de Graaff accelerator. A computer program is being developed to utilize it to quantitatively analyze the elemental content of air particulate samples.

R802914 02

Objectives of the proposed work in continuation of the grant are to determine the acute and chronic toxic levels of cyanide to six species of fish and to invertebrates. The work will be accomplished by flow-through bioassays covering all life history stages from egg to reproducing adults. To date 163 acute tests have been made on six fish species and one invertebrate. Parameters tested have been temperature, oxygen, life history stage, and pH with different concentrations of cyanide. Projected work includes completion of acute tests on a wide temperature range and initiation of chronic tests on four fish species. The effect of temperature and seasonal acclimatization will be determined.

S802940 01 0

The objectives of this project are to (1) develop a machine for subsurface injection of liquid livestock manure as a means of recycling animal wastes, (2) evaluate environmental problems & costs associated with recycle of liquid manure on agricultural land through subsurface injection, and (3) determine the effects of subsurface injection of liquid.

R802955 023

It is proposed to continue for one additional year the research on pollution from septic tank disposal fields.

The major objectives of this project are:

a. To evaluate the passage and accumulation of pollutants in domestic septic tank disposal fields by use of field and lysimeter studies. The major pollutants to be investigated are total and organic carbon, ammonia, nitrate, nitrate and organic nitrogen, phosphates, salts, fecal bacteria and bacterial virus.

b. To provide a series of test plots available to EPA's National Ground Water Research Program at Ada, Oklahoma, for the study of movement and degradation of organic compounds in subsurface water emanating from septic systems.

The lysimeters and field plots are established and have been operational for nearly one year. Three undisturbed soils are enclosed in lysimeters and two soils are being investigated in the field. Application rates are based on design specifications of the Public Health Service.

At these application rates, changes in the field moisture regime have been negligible. Two additional fields have been started to which the septic tank effluent will be added on demand to keep the field wet at all times.

At the design application rate, breakthrough of soils has occurred in the sand lysimeters, and indications are that it is just beginning in the loam lysimeters. It is anticipated that breakthrough will not occur in the clay lysimeter for several more months. To date, only one collection point has indicated the presence of fecal bacteria at a depth of 120cm below the septic field.

S802958 01

To design, construct, and demonstrate a system to recirculate wash water through the first two washers of a leafy-green vegetable processing line in a commercial food plant.

To compare the performance of a wash line which incorporates the recirculation system with that of a conventional one time water use system. Criteria for comparison will be: amount of water required; amount and quality of effluent; and quality of food processed.

To determine the relationship of both biological and inorganic matter content of the recirculated wash water to the operating variables of the washing system.

To develop a simulation model of the recirculation type washing system.

To characterize in terms of quantity and quality all of the major waste streams of a typical leafy-green vegetable processing plant.

A system consisting of two washers with independent water systems and settling tanks will be constructed by Virginia Polytechnic Institute and State University. This system will be installed in the Dulaney Plant at Exmore, Va. and tested under commercial operating conditions. Data will be recorded on total water use, quality of effluent and quality of food processed for both experimental and conventional washing systems. Comparisons will be made.

R802959 02 02

The persistence and toxicity of pesticides and their decomposition products represent a serious environmental problem. The action of sunlight through pesticidal photodegraded to chemicals of greater or lower persistency and greater or lower toxicity. Currently considerable effort is being directed toward understanding the nature of the photochemical processes of pesticides, the relative role that photochemistry plays in the fate of the pesticides, and to some extent, to evaluate these processes under conditions which are environmentally realistic. The proposed work involves a continuation of the study of the various ways which surfactants (applied simultaneously in pesticidal formulations) alter the photochemical pathways and rates in aqueous solutions and on soil surfaces. Studies of such surfactants on the photochemistry of similar organic molecules show that profound changes can be effected by surfactants. Initial results indicate that pesticide photochemistry on soils is very dependent on surfactant additives and moisture content of the soil.

R802964 03

Objectives - To develop analytical procedures to be used in identifying organic compounds in textile plant effluents.

Approach - Organic compounds isolated from effluent samples furnished by cooperating textile plants are being analyzed by gas chromatography/mass spectrometry/computer techniques (GC/MS/COM).

Progress - A number of volatile organics have been isolated from the effluent samples using a modification of the Bellar technique. Subsequent identification of these compounds has been achieved by GC/MS/COM. Thin-layer chromatography is being used for separation of dyes and non-volatiles.

R 802 967

Project seeks: (a) to determine the capacity of native vegetation to absorb the major toxic air pollutants, sulfur dioxide, nitrogen dioxide, ozone and hydrogen fluoride and to identify and evaluate general plant properties and external factors which determine or modify plant sink potentials, (b) to estimate the probable role played by vegetation in the U.S. and in the region of Salt Lake City in removing the toxic pollutants from the atmosphere.

S-802985

The primary objective of this demonstration project is to show the advantages of implementing a "package" of technological improvements within the lateral subsystems in reducing the salt load entering the Colorado River. Although major emphasis is upon on-farm improvements, considerable improvements in the water delivery conveyances are also required, as well as some improvements in lowering high water tables (drainage).

This project will utilize each of the salinity control measures developed in Grand Valley, as well as the addition of various irrigation methods, to demonstrate the complete package of salinity control measures for two laterals under each of five canals. No single measure will adequately alleviate the salt load from an irrigated area. Demonstrating the complete package of salinity control measures will not only be a "first," but additional salt load reductions can be expected beyond the sum of each individual measure because of improvements in the operation and management of each lateral. The lateral subsystem begins at the canal turnout and includes all of the water conveyance channels below the turnout and the farm lands served by the lateral water supply.

R 802988

Propose a three part research program involving policy impact studies and basic research on the interrelationships between residence and work-place location, transport accessibility, auto ownership, and air quality. In the first phase we will refine an existing model and use it to examine the impact on air quality of various transport management policies and alterations in land use patterns. In the second phase we will carry out studies of the behavioral relations involved in households choices of residential location, transport accessibility, automobile ownership, and mode to work. The third phase will incorporate these behavioral relations in policy studies that examine the effectiveness and time scale of a variety of land use and transportation controls.

The objectives of this project are to determine under what conditions new chlorinated organic compounds are formed by the chlorination of municipal wastewaters; to develop a method for the isolation and identification of such compounds; to develop a method for the determination of total organic bound chlorine in chlorinated municipal wastewater effluents; and to determine the effect of large doses of chlorine (2000-4000 ppm) on the formation of new chlorinated organic compounds in such systems. The approach of this project is to utilize XAD resins for the isolation and concentration of new chlorinated organic compounds and to identify such compounds utilizing mass spectrometry/gas chromatography and other similar techniques. The determination of total organic bound chlorine is accomplished by the use of similar concentration techniques followed by pyrolysis and microcoulometric determination of halide. In addition, the project involves the determination of amino acids in municipal wastewater effluents, both free and in the form of polypeptides and the effect of chlorine treatment on such amino acids. Progress on this project has resulted in the determination that TOCI values in chlorinated effluents are significantly increased by the chlorination of the effluent and that the effect is dependent upon the dose of chlorine use. In addition, it has been determined that over fifty new chlorinated organic species are formed when large doses of chlorine are used and that lesser quantities of the same compounds are formed when smaller doses of chlorine are employed. Preliminary results of the project have been published in an article entitled, "Formation of Organochlorine Compounds from the Chlorination of a Municipal Secondary Effluent," W. H. Glaze, and J. E. Henderson, IV, Journal of the Water Pollution Control Federation, 47, 2511-2515 (1975).

R803018 03

A significant contribution to current air quality sampling technology would be the development of a simple air sampling system capable of determining particulate loading along with size distribution over a broad range of particle size. Current research is aimed at developing a two stage particle fractionator employing series filters which are selective with respect to particle size.

The Nuclepore surface appears to be a logical choice for such a filter. The simple geometry is readily modeled as a bundle of parallel circular capillary tubes which greatly facilitates the development of a theory for filtration characteristics.

Work is near completion on a first principles model of the inertial impaction characteristics of a large pore (12 um) Nuclepore surface. Preliminary experimental data support the validity of the model and it is planned to have a validated model for filtration efficiency along with theoretical performance curves by mid 1976.

With these performance curves as a guide it is planned to conduct an experimental study to explore the feasibility of using series Nuclepore surfaces as a particle fractionator for air borne aerosols in the environment.

R803020 03

The electrostatic effects being studied can be divided into two classes: 1. The deposition of dust on the surface and 2. Effects between fibers of a fabric. We have found that under the proper electrostatic conditions most of the dust can be deposited as a porous layer or filter cake thus giving a low-pressure drop filter. Conditions which maximize this effect are being studied. Almost all of this porous deposit is easily removed in the cleaning cycle. However the removal of dust during the cleaning cycle is not perfect. After long periods of operation a nonporous deposit of dust can form that is attached to fibers extending from the fabric. This can be difficult to remove and result in a high-pressure drop. The mechanism by which this nonporous, adherent, deposit forms and methods for its removal are being investigated. Other tests indicate that there can be significant electric fields between fibers of a fabric. The mechanism responsible for the fields and their significance are being investigated.

R803030 03

Objectives - Structure, implement, verify and apply a eutrophication model of Lake Huron including Saginaw Bay and of Lake Erie including anoxic zones.

Approach and Progress - A five segment Lake Huron model has been constructed and brought to a final verification stage utilizing all available data. Phytoplankton and zooplankton reaction kinetics have been developed which simultaneously describe both Saginaw Bay and open lake waters of Lake Huron, areas which differ markedly in concentrations of both chemical and biological parameters. Preliminary nutrient reduction simulations have been performed.

A preliminary Lake Erie model has been developed and the transport regime of this model is being verified while simultaneously all available biological and chemical data are being reduced for a forthcoming eutrophication model.

R803036 02

The project objectives are to establish if a hypersensitive state (immediate and delayed) can be induced in experimental animals exposed to PtS04 and PdS04 under various experimental conditions. Also, the dose-response relationship will be studied.

Rabbits, guinea pigs and mice are exposed to PtS04 and PdS04 (various concentrations) via various routes (i.e., i.v., i.d., s.c., i.p., and skin exposure). The skin test is used to detect the allergic state in rabbits and guinea pigs. The footpad test is used in the mouse. Platinum and palladium concentrations in blood and urine per volume are determined throughout the experiment for each animal. Metal concentrations per mass in the spleen are determined for all animals after challenge dose. Metal concentrations are determined by atomic absorption spectrophotometry.

Results to date show that: 1) No immediate or delayed allergy to palladium was induced in guinea pigs or rabbits by s.c. injection of PdS04. 2) No significant level of palladium was found in the serum of guinea pigs or rabbits injected s.c. with PdS04. 3) No significant level of palladium was found in the spleens of guinea pigs or rabbits injected s.c. with PdS04. 4) Significant levels of palladium were found in the urine of guinea pigs and rabbits injected s.c. with PdS04.

R803037 02

Principal objectives of this project are the delineation of the characteristic algal communities occurring on common types of substrate in the upper Great Lakes and an assessment of the response of such communities to environmental perturbation.

The problem will be approached through comparison of species occurrence, population frequency, and community structure in benthic algal communities found near population centers and probable pollution sources with communities occurring under similar physical conditions in relatively remote areas and with communities present in historic collections from the region of interest.

Preliminary investigations have indicated benthic algal communities in remote areas of the upper Great Lakes are among the most diverse biotic assemblages known (Shannon-Weiner diversity index greater than 4.0), but that diversity is reduced in regions substantially influenced by human activities. It also appears that certain populations, abundant in historical collections, have been extirpated from affected areas.

R803058 03

We propose to continue to isolate, but en masse, the pox-like virus we found last summer in larvae of the alfalfa weevil, Hypera postica. Since this viral infection can be characterized by the yellowish appearance of the larvae, an attempt will be made to collect as many as possible of these abnormal ones.

To isolate the virus in large quantities, we will attempt to use the aqueous polymer phase system and continuous flow zonal centrifugation. The isolated virus will be purified by gel permeation chromatography.

We will also test the pathogenicity of this virus by using it as an oral and as an injection inoculum under laboratory conditions. Virulence after replication will also be tested by isolating the virus from laboratory infected larvae and using it as inoculum for subsequent experiments.

R803065 03

The objectives of this project are to measure the size distribution of outdoor urban atmospheric particulates using a Time of Flight Aerosol Beam Spectrometer (TOFABS), and to discover, in the course of these measurements, the capability, advantages and problems of the TOFABS method.

The TOFABS method is based on the fact that when an aerosol accelerates through a small nozzle into a vacuum chamber, the smaller particles reach higher terminal velocities in the vacuum chamber than the larger particles. Measurement of particle times of flight (TOF) between two focused light beams or fixed separation can therefore be used to obtain the aerodynamic sizes of the particles.

This technique has the advantages of the scattered light measurement method (fast, automatic processing and storage of data) without the major disadvantages (background scattering from air molecules, complex theory relating scattered light intensity to particle size). Thus, not only the measured data is of interest but also the demonstration of the capability of the TOFABS technique.

Current plans are to assemble laboratory and field model TOFABS and use these in a series of calibration measurements of laboratory and outdoor aerosols and, finally, in a series of measurements of outdoor urban aerosols.

R803066

This study has the objectives: (a) to evaluate the effectiveness of offstream detention-retention of surface stormwater runoff as sediment control devices and (b) to establish technical guidelines to aid designer in selecting the most efficient detention-retention facility. Available field data will be assembled and analyzed to evaluate the efficacy of each type of control measure. Theoretical approach will be taken to develop trap efficiency equations for different types of device, based on fundamental principles of hydraulics and sediment transport. The theoretical work will be checked by the field data. It is envisioned that with this theoretical approach the design can be safely extrapolated beyond the data range available. Other factors such as costs of construction and maintenance will also be considered in establishing technical guidelines.

R803068 03

A continuation of a program for the integrated control of urban cockroaches is herein proposed. Significant progress during the first two years of the program has resulted in new information on 1) outdoor habits of American and smokybrown cockroaches, 2) behavior of the cockroach egg parasitoid, Tetrastichus hagenowii, and 3) the potential for using cockroach traps in urban environments. In addition to the biological information, progress has also been realized in the area of public relations projects concerning the integrated approach to controlling urban cockroaches.

During the third year program, studies on the behavior of Tetrastichus will be continued. Evaluation of the roach trapping program will be made with the cooperation of several Texas pest control operators. Several aspects of the integrated control approach will be viewed through questionnaire data collected from pest control operators and homeowners. An economic analysis of present and future costs for roach control will be attempted. As in the first two years, a significant portion of time will be devoted to the preparation of educational materials. These will be designed for use by extension personnel, pest control operators and local civic groups.

R 803 069

The objectives of the short course will be to introduce the concepts and modeling techniques associated with the prediction, control and management of urban stormwater problems. Guest speakers representing distinguished personnel in the field will present seminar-type lectures with special attention given to the use of the Environmental Protection Agency Stormwater Runoff Management Model (SWMM) to analyze urban stormwater problems. An extensive set of notes will be published and distributed to participants prior to the course.

R803078

The City of Denver experiences over 200 atmospheric inversions each year which produce haze and decreased visibility over significant portions of Denver. In 1973, the U.S. EPA began a research study to determine the cause and sources of this pollution problem. One important aspect of the study involves the identification of aerosols collected from the atmosphere. In a previous preliminary study (1972), polarized light microscopy has used successfully to identify many of the aerosol particles.

The goals of this current proposed study is to trace the sources of aerosol particles collected by the EPA and other agencies at a network of sampling stations, by identifying the types of particles and comparing them to reference samples. The particles will be characterized and identified by polarized light microscopy supplemented with scanning electron microscopy and mass spectrometry. The data from these analyses will be correlated with meteorological and aerosol data to discover the impact of individual sources in producing haze.

R803090

The proposed research is to investigate the feasibility of utilizing for fishes clinical procedures which are accepted in determining organ dysfunction in man. Hepatic toxicity of various environmental toxicants will be determined. Effects from low level chronic administration with a representative chlorinated hydrocarbon, polychlorinated biphenol and a metal will be determined in addition to preliminary acute studies. Various endogenous and exogenous indicators of low function will be determined in rainbow trout (*Salmo gairdneri*). A major effort will be directed to determining which of these liver function tests is the most sensitive in detecting liver dysfunction in fish.

R803097 03

Continuation of the synthesis and/or purification of high-purity (99.9% goal) polynuclear aromatic compounds, chiefly hydrocarbons for possible use as analytical standards, is proposed. These hydrocarbons are of the types found in the products of incomplete combustion (automobile exhaust gases, stack gases) and hence appear as environmental pollutants. The list of PNA compounds includes the following.

1. Hydrocarbons completed:

Anthanthrene	Benzo [k] fluoranthene	Pyrene
Benz [a] anthracene	Benzo [a] pyrene	1,3,5-Triphenylbenzene
Benzo [b] fluoranthene	Dodecahydrotriphenylene	Triphenylene

2. Compounds under preparation:

Acridine	Benzo [a] pyrene	Perylene
Benzo [j] fluoranthene	Chrysene (recently added)	

3. Compounds Proposed as future work:

Benz [a] acridine	11H-Benzo [b] fluorene	Coronene
Benz [c] acridine	Benzo [ghi] perylene	Dibenz [a,h] anthracene
Benzo [mno] fluoranthene	Benzo [c] phenanthrene (recently added)	Indeno [1,2,3,cd] pyrene (o-phenylene-pyrene)

In general, known synthesis routes are used, but their improvement is sought through use of new reagents and techniques. High-pressure liquid chromatography and/or zone refining is included in the purification procedures. Modern analytical techniques (glc, lc, tlc, nmr, mass, and other spectrometric techniques) are used for identifying compounds and establishing the purity of the synthesis products.

R80310903

Objectives - Design and optimize the single-ended dye laser lidar system for operation in a simultaneous two-wavelength output mode to measure accurately SO₂ and O₃ atmospheric pollutant concentrations. The conclusion of the planned program will provide the hard design data for a practical lidar system which can be used for monitoring NO₂, SO₂, and O₃ concentrations produced by stationary sources and present in ambient conditions.

Approach - Experiments will be carried out to determine the most effective system parameters for frequency doubling in conjunction with the simultaneous two-wavelength operation. Two different approaches using single crystals will be examined. The techniques developed for simultaneous two-wavelength operation for NO₂ measurements will be extended to SO₂ and O₃.

Progress - Thus far in the second year has resulted in field measurements for NO₂ using the simultaneous mode of operation, which clearly demonstrated its advantages in terms of increased accuracy and elimination of errors due to temporal changes. The field tests detected ambient NO₂ concentrations at ranges of 5 kilometers. Using the frequency doubled laser output, preliminary field tests for SO₂ measurements were also carried out at ranges of approximately 1 kilometer.

R803115 03

A three year instrumental development and testing program is proposed to develop an accurate and high resolution system for on-line characterization of atmospheric aerosol size distribution, mass concentration and carbon content in the respirable size range (particle diameter less than 5 μ m).

R803124 03

Laboratory selection pressure will be continued on strains of Culex pipiens, Oncopeltus fasciatus and Tribolium confusum with various Juvenile Hormone Mimics and Insect Growth Regulators at least up to the F₁₀ generation. With the 6-fold resistance to methoprene now attained in Oncopeltus fasciatus, studies will commence on the biochemical mechanisms of this resistance.

With the 45-fold resistance to methoprene now developed in Culex pipiens, the cross-resistance spectrum of this strain to other toxicants will be determined, and the possible synergistic effects of enzyme inhibitors against this resistance will be explored. Confirmatory work will be done on the reduced uptake of methoprene by the resistant strain. More thorough determinations will be made of the rate of movement of the larval feeding mouth-brushes, and of the rate of movement of food in the alimentary canal, in the resistant as compared with the susceptible strain.

The R strain will be crossed with the S strain, and the hybrids then backcrossed with the R and/or the S parental strain, to see if the resistance segregates as a single factor. At the same time, it will be ascertained if the character of reduced uptake is genetically congruent with the methoprene-resistance character.

R803154 02

The objective of the proposed research are to study the short and long term effects of cadmium on the ultrastructure of type A spermatogonia along the basement membrane of the mouse testis. For the short term study male CD-1 mice will be injected with a single sublethal dose (2mg/kg) of cadmium acetate and cadmium chloride. The mice will be sacrificed at designated time interval after injection and the tissues prepared for electron microscope analysis. For the long term study mice will be given protracted doses of cadmium acetate and cadmium chloride in water over an extended period. The short and long term effects of cadmium on the ultrastructure of type A spermatogonia will be determined.

R803176 03

The studies are to determine the effects of coal-fired power plant emissions on the structure and function of a grassland ecosystem and to represent these effects in a total system simulation model.

R803213 03

During 1975, EPA operated a SO₂ fumigation system on a natural grassland site in southeast Montana, in order to simulate the SO₂ emissions from the Colstrip Coal-fired Power Plant. Observations of the anatomical and physiological effects of the fumigation system on two native lichen species, Parmelia chlorochroa and Usnea hirta, made during the summer of 1975, now give an indication of field characteristics to anticipate when using these two lichen species as biological monitors of the power plant plume in the Colstrip area during 1976.

The objectives of the 1976-77 work are to : 1) repeat and verify effects on respiration rates, nitrogen and sulfur contents, and anatomical damage caused by the SO₂ fumigation, and to extend the experimental period; 2) complete mapping of the lichen communities of the Colstrip area for tracing future emission effects; and 3) Examine Usnea from the Ponderosa pine sites and Parmelia chlorochroa from grassland sites to detect any possible effects of emissions during the first year of operation of the power plant.

R803218 015

The major addition proposed by this supplemental funding consists of experiments designed to determine the effectiveness of the overland-flow technique for polishing sewage oxidation pond effluents. Minor additions include evaluation of fixed risers for wastewater application and comparison of two different slopes on the efficiency of wastewater treatment.

R803224 02

The primary objective of the project is to evaluate the effectiveness of the modified box cut method of surface mining in reducing the impact on the surrounding environment.

The proposed work will be conducted at a site in Boone County, West Virginia, and will consist of the following tasks: (1) Determine environmental baseline parameters; (2) Documentation of mining operations (procedures); (3) Monitoring of environmental impacts during mining operations; and Document recovery of mined area; (4) Preparation of progress and final reports.

R803238 02

The overall objective of this project is to determine the contribution of atmospheric phosphorus (P) to the nutrient budget of Lake Michigan.

Monthly-integrating, bulk precipitation samples will continue to be collected at twenty locations around the Lake Michigan basin. All P forms and the remaining chemical parameters will be measured. Quantity of rainfall actually collected will be compared to meteorological data obtained from the National Weather Service.

Event, wet-only precipitation samples will be collected starting late fall, 1975 and continue until the end of the project (tentative completion date, 31 January 1977).

In-lake collection buoys will be deployed in early spring, 1976 at sites north and south of the Milwaukee area. Bulk precipitation samples collected on a monthly-integrating basis will be considered representative of atmospheric P input directly to Lake Michigan.

R803243 03

Objectives - To assess the impact of dredge spoils and sewage sludge on levels of trace metals in pore waters and overlying estuarine and nearshore waters, and to assess their impact on trace metal uptake by benthic organisms.

Approach - A. To determine sediment-water exchange rates of metals and nutrients in clean and polluted sediments.
B. To study the influence on bioturbation and other factors on these rates.
C. To study trace metal uptake by mollusca and other organisms living on the substrates.

Current plans - To continue studies of diffusion of metals out of clean sediments and systematically work up to systems of increasing complexity until we understand the effects on trace metal uptake by organisms of the various parameters influencing metal geochemistry.

The world has reached the time when it must consider itself a closed and balanced living system. The ability of a locality to unknowingly pollute to death a region or localized subsystem is well documented. The time has come for answers that quantitative, fast and accurate evaluations of how a change in the environment of a given species will affect its well being. This is more complex than determining lethal doses of environmental change. The information as to how the behavior of an organism is affected with sub-lethal doses is much more difficult to ascertain - more complex than observing life or death - it pertains to changes in the norm of behavior and these changes may be subtle.

The proposed system for the retrieval and analysis of these behavioral data will include a video camera to record the movements of organisms - either their whole body or perhaps focused on an appendage or a motor mechanism. The image will be quantized and rendered to a dedicated mini-computer by a specially built piece of hardware. The software will be developed to acquire these data in real time, perform an analysis as directed by the user via keyboard commands with an interactive display available for viewing and editing these data. In order to allow other installations to utilize these programs, they will be written in a language that is machine independent to the extent possible. The system will allow data to be accumulated for individual organisms as well as groups of the organisms.

Objectives - This project involves the design of terrestrial model ecosystems and their use with radiolabeled compounds in evaluating the fate of "substitute pesticides". Parameters which are emphasized are: degradation and fate, biomagnification, food-chain transfer, biomass transfer, leaching, volatility, plant uptake, and toxicity and organ distribution in higher animals. The influence of soil types upon the above effects and the varying effects of changes in plant species in the model ecosystem will also be studied. The model ecosystem, as developed, is suitable for evaluating the environmental effects of combinations of pesticides.

Approach - The model system incorporates soil and corn, soybeans, or cotton in a 9 l. carboy fitted with vapor traps and a bottom drain to study leaching. A variety of food-chain organisms - corn, soybeans, cotton, earthworm, slug, insects, and the vole Microtus ochrogaster, are incorporated in the system.

Aldrin, dieldrin, DDT, methoxychlor, fonofos, parathion, methyl parathion, hexachlorobenzene, pentachlorophenol, and pentachloronitrobenzene have been investigated.

S 803 251

This study will demonstrate low water use cleaning of tomatoes and recycle of the dump tank (tomato unloading water cushion) water. Cleaning will be by flexible spinning rubber disc and a small amount of water. Water use for cleaning should be reduced from the present 700 gal/ton to 6 gal/ton. In combination with the recycle system the water use for receiving and cleaning should be reduced from 930 gal/t 930 gal/ton to 120 gal/ton.

R803254 03

The principal objective during the first year was to test the significance of differences in reported symptoms classified by type associated with swimming at a beach which is "barely acceptable" in respect to local criteria for recreational waters, compared to a "relatively unpolluted" beach. The principal objective during the second year is to place four beaches on a water pollution gradient to establish a mathematical relationship between symptoms classified by type and water quality indicators. This work is an integral part of Recreational Water Criteria Program efforts to develop health effects criteria for marine recreational waters.

Trials consist of initial beach interviews on both the Saturday and Sunday of the same weekend and telephone or mail follow-ups 8 -10 days later. Pretests in 1972-73 indicated that beach interviews and follow-up questionnaires yield accurate data on demographic characteristics, bathing activities and subsequent symptoms of the population at beaches on weekends. In the first year, four weekend trials were conducted on two New York City Beaches. In the second year, four sites on a pollution level gradient at a New York City beach will be selected; four weekend trials will be conducted at each.

The current work in this project represents the final year of a three-year continuing EPA Grant. The overall grant consists of two tasks: (1) analysis of test data from full-scale, multi-burner utility boilers, burning natural gas, oil and coal fuels, concerning the effects of combustion modifications on NO_x reduction; and (2) a nationwide inventory of the air pollution emissions of NO_x , hydrocarbons (HC), carbon monoxide (CO) and particulates from stationary point sources, with projections five years in the future.

The overall objective of the NO_x control task is to develop practical guidelines for modifications of combustion in utility boilers to achieve maximum NO_x reduction within the realistic constraints of high plant efficiency, stable combustion and acceptable emissions of carbon monoxide and hydrocarbons.

The approach used throughout the overall study is to model and calculate all aspects of the problem which are reasonably well established and to quantify the remaining unknowns using multiple regression analyses of large quantities of data from full-scale boilers. The objective of the current work is to improve and integrate all of the previous models, analyses and empirical correlations into a single model capable of parametric calculations and evaluations of the effects of combustion modifications in a typical boiler on NO_x reduction and the above constraints. General guidelines will be developed from these results.

Earlier studies in the emissions inventory task have covered the sources of about 98, 94, 70 and 60 percent of the NO_x , HC, CO and particulate emissions, respectively. Studies in the current year will increase coverage of CO and particulates to about 78 and 95 percent respectively.

S 803 307

Waste activated sludge from a fruit cannery wastewater treatment plant will be dewatered by float thickening and centrifuging. To evaluate the sludge as a feedstuff, four feed rations each with a different proportion of sludge, will be fed to 8 steers, in a 68 day metabolism trial and to 24 steers in a 130-160 day finishing trial.

S803312 01 2

This study will evaluate on a proto-type scale blancher-cooler for evaluation on lima and green beans, brussel sprouts, cauliflower, and broccoli. In this system, the steam condensate from the blancher (IQB) will be utilized for spray cooling of the product prior to freezing. Significant reduction in liquid effluent volume (90%), and in the organics (70%) contained therein should be demonstrated when compared to current industrial practices.

R803319 01

Each Trichoptera species is thought to respond differently to different parameters or combinations of parameters of the physical and chemical environment. Information "bits" on these parameters are scattered throughout the literature. This work proposes to compile, standardize, and make available this data.

A literature search will be made to compile information on these parameters. The pertinent data on each common species will be compiled onto a water quality profile data sheet for that species. The referenced data will be fit into a computer program which will allow information retrieval by species, stage, or environmental parameter.

R803328 03

The ultimate objective of this feasibility study is to design and characterize a survey plan to make the desired measurements and to estimate the precision to be expected from a survey along with the cost of the operation. Precision is not always linear to cost and usually it is desirable to know the precision to be expected over a range of costs.

The objectives of the third year of this three-year study are:

To develop and evaluate a sampling survey design and field techniques required for rural runoff evaluation involving small drainage sub-basins, with compatible emphasis on:

a. Evaluating cost of various sampling precision levels including a comparison of grab techniques with instrumental methods.

b. Determining relationships between land use, physiography, physical and chemical values, rainfall-runoff, and the impact of these factors on receiving streams.

c. Evaluating modeling techniques for determining input from rural runoff and effect on the chemical and biological characteristics of receiving streams.

The final phase of this project will be devoted to analysis and comparison of 4-5 years of field data in two bay systems in north Florida. This will include several approaches that should prove informative due to the development of an extensive data base and the statistical-analytical capabilities available to this project.

1. The data base will be extensive with consistent methods of collection used in a continuous series of samples of various parameters over a period of years. We have taken some effort to sample relatively small areas (e.g., high station density) with frequency. Spatial and temporal parameters will be assessed in several ways to determine the impact of single sources of pollution on otherwise unaffected off-shore areas. The Econfinia estuary is part of one of the least polluted coastal systems in the United States. Apalachicola Bay would also fall into this category. Thus, controls are real in these studies, and the sources of pollution are still relatively uncomplicated.

2. A computer system is available for rapid analysis using a virtually limitless set of functional statistical and computational programs. Trained statisticians are an integral part of this project and will continue to interact with the biological interests to determine realistic methods of assessment of the impact of pollution on estuarine and coastal systems.

3. Benthic and phytoplankton productivity studies are now nearing completion which, together with the already developed biological data base, will add an important dimension to the multivariate analysis. In essence, we will be able to compare two entirely different energy systems and their reaction to various environmental factors (the turbid, river-dominated Apalachicola Bay System and the clear, benthic macrophyte-dominated Apalachee Bay).

4. These studies should provide some insight concerning reaction of coastal systems when pollution abatement has been executed. In this case, this would include the reduction of DDT and PCB's in Apalachicola Bay and the reduced levels of KME in Apalachee Bay.

R 803 344

The objectives of this project are to determine the potential health hazard to heavy application of cattle manure to soil by studying (1) the incidence of Salmonellea in feedlot manure in various location in Texas & (2) the movement and survival of Salmonellae in various types of soil under simulated field conditions generated in the laboratory.

S803358 01 0

A method for conversion of ferrous sulfate from spent pickle liquor to iron oxide and re-useable sulfuric acid will be evaluated. A ferric nitrate intermediate, produced by continuous ion exchange, will be decomposed to produce the oxide and nitric acid for recycle. A full scale system will then be installed in a steel mill so that the total closed loop system can be studied.

R803360 021

There are approximately 100 enteric viruses of human origin which have been isolated from sewage, rivers, sea water, and water supplies. Despite concern for the presence of these viruses, there is as yet no rapid practical assay for their identification and detection. We propose to apply immunoenzymatic methods currently under development in our laboratories which will satisfy this need. These methods will increase the reliability of and decrease the time required for identification of these viruses. In addition, the methods we propose may also be applicable for virus detection.

The proposal consists of two phases of methodology: 1) identification of enteric viruses by immunochemical staining of virus-infected cells with enzyme-labeled antibodies and 2) identification and quantitation of enteric viruses by enzyme immunoassay. The first phase has been developed by us for use in identifying selected enterovirus types; this will be extended to include identification of all enteric viruses that can be readily cultivated. The second phase will be development of methods for identifying and quantitation cellular or extracellular virus. This method involves reaction of enzyme-labeled antibodies with viral particles; virus is identified and/or quantitated by assaying bound enzyme.

R803378 01

The recycling of beef feces is being done for various purposes at several installations throughout the county. Recycled manure can be processed for feed material, used as a raw material for the production of gas, oil, methane, synthesis gas, protein, or pyrolyzed to reclaim useable constituents.

In harvesting manure for these purposes, little is known about the effects of environmental and management practices on the manure's physical, biological, and nutritional properties. Several things may happen to manure after it is deposited on the feedlot surface.

Preliminary investigations have indicated the physical, biological and nutritional characteristics of the manure are extensively affected by the environment and management factors to which the manure is subjected before harvesting. Basic information as to the effects is not available beyond the fact bacterial decomposition causes a loss of nitrogen and a reduction of reclaimable materials for other processes.

This study will determine the effects of a controlled environment and constant management factors on the feed value and physical characteristics of manure. The effects of time, temperature, humidity, rainfall, depth, ration and compaction on the feed value and digestibility, chemical composition, particle size distribution, moisture content, viscosity of slurry and squeezability will be quantified.

In conjunction with the use of new manure harvesting techniques there will be effects on runoff pollution and odor potentials of the feedlots. Hardsurfacing and more frequent cleaning schedules will be a departure from conventional lot management methods. Alterations in lot design together with new management methods may provide adequate runoff control to enable some feedlots located in problem areas to provide runoff control adequate to allow them to remain in operation.

R803401

The objectives of the proposed work are as follows: a) critical evaluation of past and current studies and their relevance to expected engine configuration at the time when methanol blends might be used as a vehicle fuel; b) definition of a research program which will address those performance, emission and practical use characteristics of methanol blends as identified as being lacking in objective a; c) evaluation of emission measuring techniques, selection of instrumentation for aldehyde and methanol measurements.

The approach used is as follows: a) determination of baseline performance and emission characteristics of a gasoline fueled multi-cylinder engine; b) determination of performance and emission characteristics of a methanol/gasoline blend fueled multi-cylinder engine; c) experimental evaluation of material compatibility problems identified in objective b; d) development of emission measuring techniques identified in objective c.

The current plans are to address the objectives during the first portion of the program with a conventional internal combustion engine. During the latter portions of the program, futuristic power plants identified in objectives a) and b) will be used.

R803430 01

The objectives of this research grant are to refine and develop the hardware and system design for a portable pyrolysis unit. This system is to convert various types of agricultural wastes into useful, saleable fuels, such as char, oil, and gas. Initially, wastes suited under this program are to be selected from such candidates as cotton gin trash, peanut hulls, and bagasse. Hardware of this general type has been under development by Georgia Tech for several years and the results have been very encouraging, based on laboratory, pilot, and near-full scale hardware tests. Although the system has already been scaled up to commercial size in an operating plant pyrolyzing wood waste, a few additional hardware refinements are indicated for processing harder to handle wastes such as those listed above. The study will include some fourteen or more instrumental test runs with complete data analysis.

R803461 011

Objectives: The major objective of this grant is to develop a population dosage methodology as an air quality indicator, and to use it to evaluate air quality improvement and air pollution control strategies.

Spatial distributions of population dosage of a trace pollutant will be determined for a test city whose air quality and population data are available and can be transformed into compatible forms for the dosage analysis. Then, the distributions of other, pollutant dosages will be determined for several other cities and/or for several population categories of the same city. Techniques will be explored to transform air quality data into a spatially distributed form or into a frequency distribution form and, population data into a smooth spatial distribution over several different sub-categories.

R803473 02

The proposed research involves the study of activated carbon adsorption of selected trace organic compounds from waters typical of those encountered at water treatment plants. The objective is to obtain data which can be used in the design and operation of activated carbon adsorbers for water treatment plants. The study is designed to show synergistic and antagonistic effects owing to interactions between adsorbate species, as well as to show the effects of irreversibility of adsorption. Both rapidly stirred batch reactors and bench scale columns will be used. Commercially available humic acids, organic matter present in deep well water, and other sources of humic substances will be used to simulate natural waters for the study. Adsorption characteristics of methylisoborneol (MIB) and geosmin which are two compounds of biological origin, a mixture of chlorophenols and benzo(a)pyrene in simulated natural water will be examined; the study will build upon the information obtained for MIB and the chlorophenols during the first year of the study.

A variety of chemical agents in our environment have been shown experimentally to alter the activity of the microsomal enzyme aryl hydrocarbon hydroxylase and thus influence the carcinogenicity of several polycyclic aromatic hydrocarbons (e.g., benzo(a)pyrene). Information is lacking, however, on the influence of exposure to widely used organophosphate insecticides on the metabolism and carcinogenic action of these agents. We have shown that subacute administration of the insecticide parathion or its active metabolite, paraoxon, to rats inhibited the in vivo and in vitro metabolism of benzo(a)pyrene. As part of a collaborative project with the Department of Pathology, this study has the goal of determining whether exposure to low levels of organophosphate insecticides (e.g., parathion) affects the metabolism and carcinogenicity of benzo(a)pyrene. Ha/ICR female mice will be used, since this strain is highly susceptible to benzo(a)pyrene induced stomach tumors. Experiments to determine the optimum route and dose of benzo(a)pyrene administration will be carried out in the same strain of mouse for induction of pulmonary tumors. To achieve the objective it is necessary (1) to determine the relationship between the level of parathion exposure (feeding for 90 days) and the incidence of benzo(a)pyrene induced tumors, and (2) to measure the level of benzo(a)pyrene and its metabolites (e.g., benzo(a)pyrene-epoxide) in lung and stomach in order to understand better the data obtained might provide some basis for evaluating the potential hazards to public health of combined exposure to insecticides and carcinogenic hydrocarbons in our environment.

R 803 494 02

The Fourth International Congress on Event Related Slow Potentials of the Brain (EPIC IV) will be held in Hendersonville, North Carolina from April 4-10, 1976. The Congress will focus on the neurobehavioral effects of environmental insult. A workshop format will be used to assess the utility of evoked potential techniques in health effects research and to encourage neurobehavioral study in areas of environmental concern. Other topics to be considered include the electrogenesis of slow potentials and their relationship language, motor control, aging, psychiatric disorders, and information processing.

R803510 02

The overall objectives of this project are a. to further develop and refine efficient rapid and inexpensive monitoring methods for the detection and quantitative assay of low levels of viruses in large volumes of water and wastewater, and to evaluate various monitoring and detection methods by standardized and controlled procedures. b. to develop effective and economical procedures for the inactivation of enteric viruses in wastewater, renovated water and other forms of polluted water by ozone and to establish reliable methods for the control and evaluation of the process.

R803516 02

It is proposed to study the oxidation of sulfur dioxide in the atmosphere using the techniques of matrix-isolation and molecular fragmentation. Reactions of olefins and ozone and the subsequent oxidation of SO_2 will be monitored with a Model 12-A Fourier Transform Interferometer. Spectra of mixture of ethylene and ozone suggest the formation of at least two reaction intermediates. Argon diluted samples of sulfur dioxide and isotopic ozone revealed appreciable ^{18}O oxygen exchange only after the sample was allowed to stand for two days. Detection of the reactive species provides the kinetic and structural data necessary to elucidate the oxidative mechanism of SO_2 and other pollutants such as the nitrogen oxides and vinyl chlorides.

R803 548 02

Experimental programs, symposia, and publications throughout the world continue to indicate that methanol and methyl* fuels are strong candidates as alternate automotive fuels. The basic objective of the proposed work is a continuation of the comparative characterization of engine performance between Indolene and methanol which is now well under way. The resulting evidence will then be critically examined with the objective of predicting ways for the further enhancement of performance and emissions reduction of methanol fueled vehicles.

The proposed work will continue experimentation using dynamometer mounted engines and emissions instrumentation that are already committed to this activity. Evaluation of alternate fuel preparation systems which are now under construction will be incorporated in the experimental program. Methyl fuel performance and emissions contrasts will be drawn.

*Methyl fuel is defined as methanol plus peripheral compounds which may be present from high volume, low cost production.

R 803 560

The objective of this grant is to study and develop methods to measure the emissions from stationary sources with the necessary dilution to simulate the conditions as the emissions exit from the stack. The effects of dilution and cooling on the total mass of the particulate emissions, the particle size distribution, and the chemical composition will be studied.

R803561-02

The proposed research is directed at using fast and highly sensitive battery of genetic tests and simple tests on cell morphological changes in order to critically evaluate the effects of low intensity microwave radiation. Since the non-thermal (less than 1mW/cm) effects of microwaves are difficult to distinguish from the thermal effects in large whole animal systems, their distinction will be studied, using repair-deficient his-mutants of Salmonella typhimurium; D-4 strain of Saccharomyces cerevisiae; ad 3A and ad 3B two component heterokaryons and excision repair-deficient mutants of Neurospora crassa, will be used to investigate chronic and delayed effects of continuous (CW) and pulsed microwaves, existing in our environment. Work will then be extended to study alteration, if any, of repair process by microwave radiations using human fibroblast cultures.

R803565 02

The general objectives of this demonstration project is to show the feasibility of alternative water management practices on the quality of drainage return flow and soil salinity in the Upper Rio Grande basin. The project will consist of a 650-acre demonstration site and a 4-acre test site. In the 650-acre demonstration site a combination of present-day irrigation technology will be used to show how through modern water management the return flow quality and quantity can be improved. The feasibility of irrigating at or near 100 percent irrigation efficiency with water of medium salinity (1200ppm), which while maintaining optimum crop yield over a period of many years, will be shown on the 4-acre test site.

A second objective is to evaluate the hydro-salinity computer model for predicting the quality of drainage return flow (developed for the Environmental Protection Agency) on the Mesilla Valley in New Mexico with data obtained during the course of this study supplemented with data from other local, state, and federal agencies.

The Northern Cheyenne Tribe, via the Northern Cheyenne Research Project, desires to develop an in-depth knowledge of the chemical and physical character of reservation water resources, and the interrelation of water to other resources, so that the tribe can make formal choices in planning coal development. A three-year study plan has begun to: (1) gather and interpret baseline data concerning the water resources and the interrelationships of these data to land, biocommunity, supply needs and energy resources of the reservation; (2) ascertain potential adverse chemical physical, and economic impacts to reservation water resources from coal development; and (3) develop a comprehensive water resources management plan that will aid present and future planning for resources exploitation. Standard field and laboratory methodology are being employed in assessing the geology, surface water, and ground water of reservation lands. Baseline discharge and water quality data collection has begun for 6 reservation streams. Well inventories, a basic ground water monitoring program, and collection of ground water quality data has begun. Stratigraphic correlation of the regional and local geology is being undertaken to establish potential development or priority areas. During the second budget period more detailed analyses of selected priority areas are planned.

The present interdisciplinary study is directed towards the identification and analysis of the elements of an effective decision-making and implementation process concerned with the national goal of improved quality of irrigation return flows. The four areas selected for study are: (1) Yakima Valley, Washington, (2) San Joaquin Valley, California; (3) Grand Valley, Colorado; and (4) Mesilla Valley, New Mexico and El Paso Valley, Texas. The major objectives are: (1) Identify the appropriate technologies and the institutional alternatives that together may improve irrigation return flow quality control; (2) Assess the combinations of technologies and institutions as to the feasibility of implementation in the four selected study areas; (3) Evaluate results obtained in the context of national goals, policies, and objectives aiming towards the improvement of return flow quality; and (4) Analyze the process of technology diffusion and decision-making as the basis for eventual efforts of implementing irrigation return flow quality control; and (5) Evaluate specific alternative arrangements as to their appropriateness within a specific study area.

R803578 02

It has become increasingly evident that the effects of one pesticide can interact with still a second agent to produce altered biological effects upon the male reproductive system. Such pesticide interactions appear more commonly in hepatic microsomal enzyme systems responsible for metabolizing androgen. However, changes in the biotransformation of H-testosterone can also occur in male sex hormone dependent organs (e.g. prostate gland).

The proposed studies will examine the interaction of dieldrin and parathion, of dieldrin and carbaryl, and of parathion and carbaryl upon male sex hormone metabolism in the liver and prostate glands of sexually mature mice. Efforts will be directed toward elucidating some of the mechanisms of pesticide interactions upon the male endocrine system.

R803590 01

The proposed work is to conduct a symposium that will bring together all the individuals who participated in the extensive study of the Denver urban plume during November 1973. The major objectives are to (1) provide a productive exchange of knowledge concerning the plume and (2) provide a single source for all the data and conclusions in the form of published proceedings.

R803592 02

The objective of the project is to build a true monitor instrument capable of recording the mass distribution of aerosols in the laboratory and in the field. Time constants will range from minutes or less for source emissions to several hours for unpolluted air (background aerosol). A subordinate objective is to facilitate size-selective sampling of particulate matter of very low airborne concentration for subsequent physical and chemical analysis. The design makes use of the concept of the Stöber spiral duct centrifuge for aerosols and incorporates a number of quartz oscillators as size-selective mass sensors along the duct. Current plans anticipate a prototype instrument for continuous sampling and telemetric mass distribution data acquisition in the size range between 0,3 and 5 μm diameter. Preceding studies have shown that the size range can be extended (0,08 to 10 μm) and that the concept of the quartz oscillator as a sensitive piezo-electric microbalance has considerably less restrictions when applied in a spinning spiral duct centrifuge than under normal gravity conditions without size selection.

This project proposes to (a) collate and evaluate available information and data on irrigation tailwater production, its quality and reuse potentials, (b) carry out field studies to develop data not now available regarding tailwater flow and salinity and suspended matter in the Sacramento and San Joaquin Valleys of California, (c) determine least cost combination of agricultural production and labor, capital, irrigation water, and tailwater management, and (d) integrate scientific, engineering, and economic appraisals to recommend the best practicable technology for irrigation tailwater management.

Evaluate existing mathematical models for their ability to describe the simultaneous movement of water and nitrogen species within and below the plant root zone for a twelve month period. (2) Evaluate existing kinetic models for nitrogen transformations using available data and combine these with the transient soil water and solute transport equations. (3) Identify major parameters required to describe nitrogen movement, transformation and removal by the plant as well as gaseous losses to the atmosphere. (4) Consider spatial variability of selected soil physical and chemical properties and their influence on the precision with which nitrogen distribution and movement can be predicted and measured in the field.

Several mathematical models for describing the simultaneous movement of water and interacting and non-interacting solutes in one dimension are currently available. Most of the models are still experimental and have not been used to simulate water and solute movement in the field throughout a growing season. Also, submodels to describe chemical changes in the solute with time and soil depth (e.g. nitrogen transformations) have not been included in many of these simulation models. Special attention will be given to efficiency of computer program, accuracy, and number and general availability of parameters required to simulate the movement and distribution of water and solute in the soil profile with time. Through an evaluation of the available basic - and submodels, a single model for water and nitrogen-movement will be assembled and tested using existing field and laboratory data. Physical models for water and nitrogen movement as well as chemical and biological processes influencing nitrogen behavior will receive major consideration. The solute and water flow equation will be written for both one and two dimensions.

R803612 01

Objectives - (a) to find out how rapidly, how completely, and by what mechanism nitrogen in waste water is converted to atmospheric nitrogen during overland flow over grassed soil surfaces, (b) to determine the mechanisms by which orthophosphate is removed from waste water during overland flow.

Approach - Laboratory and growth chamber experiments will be carried out dealing with the mechanisms involved in denitrification losses of nitrogen and soil fixation of orthophosphate during overland flow of wastewater. ^{15}N and ^{32}P tracers will be used to distinguish between added nutrients and those in the soil-plant system.

Current Plans - Wastewater containing labelled nitrogen compounds will be allowed to flow over grass-soil surfaces and the amount of both native and added nitrogen denitrified and returned to the atmosphere, the amount taken up by plants, the amount flowing out of the system, and the amount reacting with the soil will be determined.

R803613 02

The Science Information Services Department of the Franklin Institute Research Laboratories will prepare a monthly publication entitled Municipal Technology Bulletin, Vol. 4, provide input to the Water Resources Scientific Information Center (WRSIC) Data Service, and prepare camera-ready copy of all abstracted and indexed documents processed to the Project Officer. By continuously surveying the United States' and foreign technical literature and maintaining close liaison with various research organizations in areas of municipal wastewater pollution control, SIS will emphasize the following subject areas: urban runoff and sewers, tunnel technology, patents, treatment methods, analytical techniques, hydrology, and model studies.

R803620 01

Objectives: To select and optimize a polybenzimidazole reverse osmosis membrane system for chrome rinse bath treatment and to tailor it to the specific application.

Approach: A laboratory study of membrane optimization and performance characterization will be carried out. Flat sheet membranes will be prepared. Membrane preparation variables, including film casting conditions, coagulation variables and annealing conditions will be investigated to obtain optimum membrane properties for rinse bath treatment. Membranes will be tested under flow conditions at pressures up to about 600 psi against synthetic rinse bath solutions containing chromic acid at realistic concentrations. Product water flux and solute rejection will be determined on membrane variants.

Current Plans and/or Progress: Materials and equipment for a high-pressure test flow loop are being assembled. Analytical test methods are being studied

R803631 02

Formation of N-Chloro compounds by the reaction of aqueous chlorine with nitrogenous organic material in water supplies is being investigated. The object is to assess and determine the effects the formation of such compounds may have on analytical determinations of free and combined chlorine in treated waters and relations of their formation to the disinfecting process itself.

Two approaches are being used: (1) Reactions of single organic compounds thought likely to be present in surface waters, including pyrimidines, purines and pyrrolic compounds, are being studied individually; (2) Separation and identification of nitrogenous organic compounds from typical surface waters is being attempted.

The most interesting finding to date is that cytosine reacts to form a mono N-chloro derivative with reactivity like that of dichloramine, NHCl_2 , and an N,N-dichlor derivative with reactivity like that of monochloramine, NH_2Cl .

R 803 642

The objective of the project is to complete the study on the nutritional status of algae present in Lake Ontario and to investigate the potential amounts of nitrogen and phosphorus entering Lake Ontario from tributary sources which may become available for algal growth.

803 643

The primary objective of the proposed research is to determine the sensitivity of a serologic-epidemiologic methodology for appraising the health effects of human exposure to municipal wastewaters. The approach is to conduct a three-year prospective epidemiologic study of persons exposed on an occupational basis to wastewaters, namely, sewer maintenance workers. The study population will include workers newly engaged in sewer employment, workers with several years of sewer employment, and a control group.

The protocol involves: periodic immunologic, virologic and bacteriologic examinations of sera, urine, pharyngeal swabs and stool; yearly multiphasic physical examinations; health diaries; evaluation of sickness and absenteeism reports; work observations; and selected follow-up of worker families. The results will be statistically correlated.

The proposed research will also assess the sensitivity of this epidemiologic-serologic approach to a determination of the human health risks of other exposures to wastewater discharges such as: recreational use of waters receiving waste effluents; living near wastewater, disposal facilities, and living near or working near sites of the land application of wastewaters.

The objectives of this work are to continue an effort to determine health effects data and to prepare a document recommending a drinking water standard for molybdenum. Molybdenum is an element which is a micronutrient for plants and animals in that it plays a crucial role in some flavoenzymes. At sufficiently high rates of intake molybdenum is toxic to organisms; ruminants are much more sensitive than nonruminants.

The Rocky Mountain States produce essentially all of the U.S. molybdenum. Much of this product is processed and used in the eastern U.S. The occurrence of significantly elevated levels of molybdenum in drinking water due to industrial sources has been documented and STORET data indicates that this occurrence is not confined to the Rocky Mountain region.

The specific objectives of the program are to answer the following questions: 1) How much Mo are humans receiving in their total diet? 2) Does the biological activity of Mo in food differ from that in water? 3) How much Mo is accumulated and what are the tissue levels in humans on normal and elevated intakes? 4) Are there any detectable effects of elevated Mo intakes at the various animal levels of organization? 5) What is the level of Mo intake in water that causes no detectable effect?

The work will consist of studies on both laboratory animals and human volunteers and will consist of: 1) uptake and excretion in rats and humans; 2) tissue levels in rats and humans exposed to low and high levels of Mo in their diet and environment; 3) absorption of Mo in rats and humans; 4) effects of various animal levels of organization in rats and humans of elevated Mo intake; and 5) prepare a criteria document.

The purpose of this research is to develop a method of separation, identification and determination of nonvolatile organic compounds present in drinking water supplies. Samples of water-soluble residue will be obtained from the EPA Water Supply Research Laboratory, NERC-Cincinnati and studied for total separation of nonvolatile organics by the application of high pressure liquid chromatography. This method will also be studied for its applicability to the nonvolatile water-soluble organic compounds obtained in our study of municipal water supplies in Baton Rouge, Louisiana. Identification and quantitation of the organics will be studied after separation has been effected. The results of this investigation will aid in establishing water quality standards in this and similar areas.

R803651 02

This proposal describes a continuation of research in progress on the investigation of chemical ionization mass spectrometry for analysis of organic and organometallic compounds. Methods will be developed for the trace level quantitative determination of mixtures of metals as their volatile chelates using a chemical ionization mass spectrometer under computer control. The mixture spectra will be analyzed by comparing them with calculated spectra for the pure chelates. The ligands to be used are substituted B-diketonates related to acetylacetonate. Either positive or negative ions can be analyzed. A reference file of spectra of pure organic compounds suspected to be present in polluted atmospheres will be generated. It will be used to analyze spectra taken from mixtures of organics. Studies will be carried out of a series of carbonyls as well. Finally, real mixture samples will be provided by the U.S. Environmental Protection Agency for analysis of particulates which will contain organics, organometallics, and inorganic compounds.

R803660 020

Objective of study is the correlation of observations of aerosol size distributions in the atmosphere and in smog chambers with the theory of aerosol dynamics through mathematical descriptions and numerical simulation of the basic growth processes of particulate matter. Currently, simulation has been achieved of urban pollutant episode conditions for particulate matter. Work is continuing on simulation of pollutant plumes and inclusion of advection, convection and diffusion in the general model.

R803662 01

Disposal of animal wastes on the land with production of food and fiber may turn a waste into a resource. However, animal wastes contain salts and chemicals which can pollute runoff waters and affect the soil at the disposal site.

The objectives of the proposed work are:

1. Evaluate the effects of roughage content and salt content of the ration upon amount and composition of wastes from beef cattle in confined feedlots.
2. Evaluate the influence of covered versus open pens upon the chemical and physical properties of wastes to be removed from the pens.
3. Determine the maximum application rates for disposal of wastes on the land compatible with maintaining reasonable levels of crop production with pollution control.
4. Determine the concentration and movement of chemical and bacteriological waste components of surface runoff or leaching through the soil under the prevailing climatic conditions.

The results will be used to formulate guidelines for disposal of wastes on the land while producing a crop with a minimum of water pollution.

The objective of this research and development program is to optimize the presently investigated cellulose pretreatment and acid hydrolysis techniques and to develop the data necessary for design and scale up of the most promising system for a 1-ton cellulose day pilot plant for the utilization of the cellulose values from solid wastes by conversion to glucose. A two phase study is proposed to attain this objective. Phase I involves the experimental optimization of pretreatment and acid hydrolysis technology and the development of data which will identify the most promising system for design and scale up to the pilot plant size on a cost effective basis. All process steps will be studied with particular attention to improving upon and rationalizing current procedures for glucose product recovery. Glucose sample products will be submitted to the contracting agency for study and evaluation.

In Phase II the data necessary for design and scale up of the waste cellulose conversion process under study will be developed so that a complete engineering and economic study of the proposed 1-ton cellulose/day pilot plant for utilization of the cellulose values of various solid waste feedstocks by conversion to glucose. The waste cellulose feedstocks will be selected from agricultural, industrial, and municipal sources. The design study will include estimates of process investment and operating costs as well as a technical and economic comparison of the process with other methods of glucose production. Recommendation will be made for further actions to best implement the process technology developed in this research program.

A study is proposed for the continuation research, development and standardization of baculovirus identification techniques to be utilized for detailed studies to elucidate, more definitively, biological interactions and fate of viruses in non-host systems. This will involve a careful biochemical and biophysical study carefully correlated with the capability of selected serological techniques to monitor any biological activity of the virus desirable to detect. From this should evolve standardized procedures and reagents for *in vitro* and *in vivo* detection of suspect systems for virus, personnel monitoring, and/or evaluation of quality control during mass production of virus for applied uses. More importantly, the potential for infection of a non-target organism can be evaluated in specific terms of detectable viable and non-viable interactions, and thereby more accurately judged in terms of potential biohazard in both short- and long-term application. Such information will be necessary for the ratification of the expanded use and application of a baculovirus or baculovirus/chemical pesticide combination in the environment for arthropod control; an alternative application which shows promise and potential.

R803673 02

Influence of tertiary waste treatment of sewage from the city of Ely, Minnesota, on food availability, feeding, growth, species interaction, survival and distribution of walleye, Stizostedion vitreum v., northern pike, Esox lucius, lake herring, Coregonus artedii, and perch, Perca flavescens, are being defined through a three year program involving field sampling by trawl, gill net and seine.

Analysis of growth in walleye, lake herring and northern pike, based on two years of sampling, suggests growth is excellent but is undergoing decline in response to improved waster quality conditions.

Walleye feeding rates (mg/g/day), defined over a two year period, suggest feeding is generally not restricted by food availability. However, small reduction in growth of young-of-the-year yellow perch could result in increased numbers consumed by walleye and food limiting conditions. Improved water clarity and expanding aquatic vegetation were suggested to have significant negative effects on size of the daily meal.

R803678 01

The objectives of this work are to design and construct a mobile pilot plant facility to test and demonstrate a novel combination of processes designed to recycle cooling tower blowdown at low cost, utilizing waste heat.

The approach is to concentrate the blowdown in a vertical tube evaporator after the addition of a few parts per million of a selected surfactant which provides a substantial increase in the evaporator performance (interface enhancement). The distillate is returnable to the cooling tower cycle, or can be used as boiler feed makeup. The surfactant additive is stripped from the concentrate for recycle, by means of foam fractionation, and the clarified concentrate is further evaporated to recover useful salts and to provide a final blowdown of solids or slurried solids for ponding or disposal.

The primary effort to date on the mathematical modeling of eutrophication in Lake Ontario has been directed towards several areas:

- a) initial sensitivity runs using the Lake 3 model
- b) extensive compilation, reduction and plotting of the IFYGL data base
- c) development of a verification analysis framework for the Lake 3 model
- d) development and early testing of a model of Rochester embayment.

A detailed and intensive investigation using a three-dimensional representation of phytoplankton growth in Lake Ontario (Lake 3) is the objective of these efforts. The lake wide Lake 1 model which previously has been verified and used for lake wide simulation will be used to further develop the kinetic interactions. A modeling framework will be developed which will begin incorporating a more realistic representation of the phytoplankton biomass through differentiation of the phytoplankton types and an interaction scheme with higher trophic levels. This differentiation is important since certain types of phytoplankton impact water use in different ways. As the multi specie model is developed, and verified with available data, the necessary kinetic structure will be incorporated into the simulation using first the Lake 1 model and then, where appropriate, the Lake 3 model.

R803683-01

Description of the Program - The program involves establishing a multi-material source separation system in an urban area, Somerville, Massachusetts:

- . Weekly curbside collection of flat paper and mixed cans and glass; and
- . Use of a compartmentalized collection vehicle

Program elements include: 1) Feasibility analysis (already completed); 2) Program design; 3) Implementation; and 4) Evaluation and documentation.

Objectives - The objectives of this program are as follows:

- . To demonstrate and evaluate a multi-materials source separation program in an urban area.
- . To document the demonstration and facilitate information transfer to other communities across the country.

In accomplishing the objectives outlined above, the program will demonstrate alternative source separation techniques, collection methods using a compartmentalized vehicle, and innovative methods of developing public participation in the program. It is anticipated that the results of this demonstration program will be of considerable benefit to other municipalities across the country, and that the techniques developed can be directly transferred to other source separation programs.

Objectives - The objective of this proposal is to integrate our efforts of the first year into a comprehensive model, in order to determine the atmospheric residence time of airborne pollutants and the most probable sink areas for pollutants emanating from industrial complexes in the eastern United States.

Approach - The objective will be accomplished by integrating the following studies -

i) Application of the Lagrangian trajectory model using the averaged wind in the mixing layer, combined with precipitation data.

ii) Determination of the diurnal variation of the depth of the mixing layer and of the relative amount of pollutants that will be available for long-range transport within the layer that becomes separated during the night.

iii) Estimation of the flux of pollutants from the mixing layer into the free atmosphere.

Progress and Current Plan - Our principal effort in the first contract period has been to develop a Lagrangian trajectory model suitable for keeping track of pollutants downstream of large industrial complexes. The model takes into account the removal processes. The model will be applied to several industrial areas in the eastern United States, where the topographical effects are smaller than in the western United States.

The screening of pure microbial cultures for bisulfite and nitrite sensitivity will be completed; particular attention will be given to the effects of bisulfite and nitrite on photosynthesis in the photosynthetic bacteria to determine whether the bisulfite and nitrite sensitivity observed in blue-green algae, photosynthetic bacteria, and Azotobacter and effects on the chemoautotrophic bacteria will also be determined.

In the near future, experiments will be initiated using the recently constructed and tested gassing chamber for the determination of the influence of prolonged exposure of soil to continuous low levels of SO_2 . The following will be studied initially: SO_2 effects on soil algae as measured by $^{14}\text{CO}_2$ uptake and chlorophyll determinations; SO_2 effects on total biomass or heterotrophic populations of soil as measured by ATP content of soil and ^{14}C -glucose oxidation; SO_2 effects on the solubilization of major cations; SO_2 effects on nitrification as measured both by ammonium, nitrite and nitrate analysis and numbers of nitrifying microorganisms determined through most-probable-number counts; accumulation of sulfite and/or sulfate during the course of incubation and the effects on soil pH.

Further studies of SO_2 effects on soil processes and microbial populations will be carried out; the nature of these studies will be dependent on the results of the initial investigations.

R803704 01

The project is directed towards the problem of the dispersion and fate of hazardous materials in large lakes and will emphasize the dispersion and fate of materials in the near-shore and near-bottom aquatic and sedimentary environments. The project will (1) conduct a general but idealized study of the dispersion and fate of hazardous materials in the near-shore environment, including mathematical modeling, and (2) apply these general studies to a specific hazardous material and a specific site, including validation of the mathematical model by comparison with field observations at this site. A major part of the project is an investigation of the exchange processes occurring at the sediment-water interface, an important but not well understood component of the mathematical model. This part of the project will involve field and laboratory work.

R803705 01

The two main objectives of this proposal are (1) the direct assessment of the relative toxicity of combustion products of 4 different diesel fuels as emitted from a diesel engine and diluted and cooled to gas concentrations and temperatures compatible with biological test systems; and (2) the measurement of the relative biochemical toxicity of 6 or 7 chemically separable fractions from the collected combustion products of one of the fuels.

A secondary objective is to utilize and compare the biochemical alterations resulting when in vitro cell culture systems of human, baboon, and rodent blood and lung origin are directly exposed and utilized as the biological test system.

The biochemical indices to be used upon exposure of baboon macrophages include macrophage migration and response to MIF, phagocytic ability, aryl hydrocarbon hydroxylase (AHH) activity, ATP concentration, and RNA precursor incorporation rate. Upon exposure of other cell types, the following parameters will be measured; collagen synthesis in WI-38 cells, response of baboon lymphocytes to mitogens, RNA and DNA precursor incorporation rates, AHH activity and inducibility, proliferative capacity, viability, and colony forming ability.

For each cell type, the induction of repair replication, indicative of damage to the cell DNA, will be measured.

R803712 02 0

This project will optimize and evaluate, on a pilot-scale basis, a low waste generating process for the production of potato starch and protein.

R803715 02

The objectives of this project are to determine the extent and nature of interactions between fuel sulfur and NO formation mechanisms in combustion processes. Work completed to date includes an examination of the effect of fuel sulfur on thermal NO from gaseous turbulent diffusion flames. It was found that about 3,000 ppm SO₂ in the exhaust could result in thermal NO reductions of between ten and twenty percent, but that the greatest effect was present when SO₂ concentrations were high on the fuel lean side of the flame front. It was also concluded that results were dependent on aerodynamic factors caused by changes in swirl and injector type. The results give new impetus to our objective of attempting to relate premixed flat flame data to turbulent diffusion flame phenomena. This report also describes preliminary results on the effect of fuel sulfur on thermal and fuel NO from distillate oil flames. It was found that fuel sulfur did inhibit thermal NO but that its effect on fuel NO was negligible.

Work completed on the more fundamental aspects of this project include the design fabrication and shakedown testing of a versatile flat flame combustor and the conceptual design of the diffusion flame combustor. In addition a simplified set of reactions that adequately describe NO formation from methane/air flames was developed as a prelude to investigation of the effect of sulfur dioxide on both prompt and thermal NO. These results lead to new insight into the role of superequilibrium atoms on prompt NO. Mechanisms of NO reduction were also investigated, as a prelude to determining mechanisms of fuel nitrogen conversion, and the effect of SO₂ thereon.

R803717 01

The objective of this investigation is to establish a design to remove hazardous materials in the leachate from industrial sludges in landfills using inexpensive clay minerals and other sorbents such as fly ash and bottom ash. On the basis of our laboratory studies, EPA Grant #803 717-01-0, we have found that a combination of naturally occurring sorbents can be used to remove contaminants in the leachate from a calcium fluoride, metal finish, and petroleum sludge. A one year field study is proposed to obtain the engineering data required to carry out full scale demonstration.

Of these sludges, calcium fluoride sludge has been selected for the field study because it is produced in large volumes wherever fluoride is used in manufacturing processes, and the leachate generated from this sludge contains 6 ppm soluble fluoride. Two epoxy lined concrete pipe lysimeters, one placed in vertical and the other in inclined position for varying hydrological conditions, will be used in this investigation. Both influent and effluent leachates will be analyzed for the sorption capacity as well as the removal efficiency of the sorbents. The anticipated results will provide the engineering data, such as the composition and amount of the sorbents required and cost estimates for the disposal of calcium fluoride sludge in landfills using this approach.

R8037222 01 2

This project is designed to establish the final forms of the mathematical algorithms making up the Pesticide and Nutrient Transport and Runoff Model. This will essentially involve refining and modifying the model reported in EPA Report 60/2-74-013.

R803727 02

Objectives - To identify possible impacts of coal mining and development in the Great Plains on the surface and groundwater systems of the surrounding area. Meeting this objective requires the collection of sufficient data to test or develop watershed or management models which will be used to measure or predict impacts of development.

Approach - Collection, analysis and synthesis of geo-hydrological, overburden and chemical data from three study areas, one in each of the three participating states. Each of the areas is expected to be mined in the near future.

Current Plans - States have been selected in each of the three states and negotiations for use completed or pending in each. Some field data have been obtained in each state, and most of these data have been reduced and analyzed. Some instrumentation has been installed. Plans for FY 77 include completion of equipment installation, comprehensive analysis of data as they are obtained, and start on synthesis to fulfill objectives. Mining should begin in FY 77 on at least two of the sites.

R803728 01 1

A number of citrate analogs, with fluorescent tags, and "Suicide Compounds," will be prepared so that they may be evaluated as selective or differential agents in coliform, aeromonas and vibrio enumeration media. These materials will, therefore, aid in the development of improved methods for the enumeration of the above-mentioned organisms as potential indicators of water quality.

R803740 01

The purpose of this investigation is to develop a methodology and a monitor to detect a chronic or acute industrial discharge to a municipal treatment system which would cause process upset and poor performance. Biological sludge normally encountered in a municipal system will be employed in a laboratory biological treatment unit to simulate the operation of the wastewater treatment plant. The ten industrial wastewaters determined to be major contributors will be selected for evaluation in the laboratory simulator at varying dilutions with a residential municipal waste. The monitor will be evaluated on a pilot plant unit using a municipal waste. Parameters which will be measured include pH, DO, conductivity, temperature, BOD₅, TOC, COD, and SS. Several other alternative monitoring approaches will be evaluated, such as biological inhibitor detector (BID), ATP, TTC, and oxygen uptake rate.

S803743 02

Objectives - The principal objective of this project is to develop and implement an RTAC system for the North Shore Outfall Consolidation Project in the City & County of San Francisco. In addition, there are several secondary objectives that will make this project generally useful to other cities contemplating RTAC systems for control of combined sewer flows. These are:

1. To develop the control model software in Fortran computer language and in a sufficiently general manner if possible so that it can be applied to other cities without major modification.
2. To perform a cost-effectiveness analysis on alternative control strategies to determine the best RTAC system for controlling overflows from the North Shore System.
3. To describe the step-by-step procedure for adapting the general control model to a specific prototype and for installing these models on the control system hardware.
4. To demonstrate the operation of the North Shore RTAC System.

Approach - The technical work required to develop & implement the RTAC system for the North Shore Project has been divided into the following six major categories:

1. Control System Design
2. Control Model Development
3. Simulation Model Development
4. Rainfall Model Development
5. Control System Implementation, and
6. Project Management and Reporting

R803744 02

Objectives - To demonstrate establishment and operation of a commercial scale chemical waste landfill.

Approach - The Grantee is the principal state environmental regulatory institution in Minnesota and acts in the capacity of project manager. Contractual and facility ownership responsibilities have been assumed by the Metropolitan Waste Control Commission (MWCC). The MWCC, in turn, will oversee and manage the design, site selection, environmental analysis of sites, construction, and operation of a commercial scale chemical waste landfill demonstration facility.

Current Plans - The project is in its second year. During this time period site investigations will be conducted; conceptual, preliminary, and final designs will be prepared; a facility operator will be selected; and an aggressive public and institutional relations program will be furthered.

R803753 01

Reverse osmosis (RO) will be used to treat rinse waters from electroplating operations. This continuation program will consist of two phases. In Phase I, an RO unit will be installed on a zinc cyanide or acid zinc line and operated in an open loop; that is, with reuse of purified water for rinsing but discharge of the RO concentrate. In Phase II an evaporator will be installed to further dewater the RO concentrate and the combined system operated closed-loop; that is, with return of the RO concentrate to the plating bath. Each phase will last for seven months.

R803762 02

The objectives of this study are: (a) To complete the determination of the extent of vegetation injury and death associated with completed refuse landfills throughout the United States. (b) Determine the factors which contribute to this vegetation injury or death. (c) Present recommendations as to how to protect vegetation existing adjacent to a refuse landfill. (d) Establish recommendations as to how to determine when and how to plant vegetation on and/or about a refuse landfill. (e) Establish recommendations as to what species of vegetation would be best suited to living on and about a refuse landfill.

The project will include field and laboratory investigations. The laboratory investigations will entail a study of effects of various landfill gas mixtures as found in the field of individual components thereof on selected plant species grown in closed systems.

Field investigations will include the growing of selected tolerant and non-tolerant species (as determined from the literature and from survey results) on specific landfill sites and control sites off the landfill for evaluation of landfill effects; and the planting of selected sensitive species by various techniques designed to protect them from the landfill gases.

R803765 01

The method of digital photo electron autocorrelation technique in Laser Doppler Spectroscopy (LSD) is applied in determining essentially the size of particulates in aerosols and hydrosols in the laboratory. The application of the technique in the characterization of the scattered and transmitted light will be investigated. The results will be compared with the relatively unexplored but reliable conventional scattering measurements based on Specific turbidity and Turbidity spectrum. The validity of the results will be further tested by Electron microscopic measurements.

The development of the above methods and their relative merits with respect to other routine methods in their application to the in-situ monitoring of particulates in stationary source emission will be studied and critically discussed. The results obtained by the proposed research are expected to indicate greater accuracy, speed and ease of measurement, which makes the technique employed potentially important in the field of pollution monitoring, especially in the determination of particulate size in smoke plumes.

3803770 01

Objectives - a. Utilize energy that currently is unused as one step in an overall program to conserve natural resources. b. Show methods of economically and reliably heating, cooling, and managing enclosed growth structures using heated water for energy. c. Evaluate the adequacy and determine problems of enclosed growth structures as supplementary horizontal cooling towers with income potential.

Approach - Possible uses of low temperature water were studied. Enclosed plant growth structures were identified as one of the best possibilities. Investigative trips were made to a number of plant growth facilities using traditional heating methods. Trips also were made to ORNL, TVA, and EWEB to study and discuss laboratory and pilot methods of extracting heat from low temperature water. The heating system was designed using pipes in the soil and finned tube unit heat exchangers. The system permits the addition of heat pumps to raise the water temperature, if necessary. Cooling is accomplished by an evaporative pad and air moving system.

Current plans - The structure will be erected in mid 1975 and will become operative immediately. Boilers will be used to provide the warm water as the power plant is under construction and will not begin operation until 1976. Tomatoes will be the initial crop. Seedless cucumbers, lettuce, roses, chrysanthemums and forest tree seedlings will be included later. The project should demonstrate the economic feasibility of using otherwise wasted heat and result in a number of commercial applications being provided heat by the new generating plant and by other scheduled for future construction.

R803785 02

The principal objective of this grant is to demonstrate feasibility of on-line pest control which utilizes ecosystem models in pest management programs. Our approach is to use the models synchronized with real time environmental information concerning the abiotic and biotic state of the pest crop ecosystem. This will be accomplished by concurrent developments in eight principal areas: (a) multiterminal interface programs for integrating economic abiotic and biotic information, (b) ecosystem models, (c) algorithms for updating models from field information, (d) microclimatic models, (e) spatial variations in a multi-species ecosystem, (f) determination of biological windows using the models and appropriate management strategies, (g) economic models that determine the economic thresholds using the environmental and biological information of the pest crop ecosystem, market conditions, etc., and (h) evaluation of the different management strategies. Models have been developed for host crop, pest populations, and two parasitoids. Microclimatic models which relate soil temperature at various depths to air temperature were developed.

R 803 798

The human body burden associated with consumption of water with high concentrations of arsenic and selenium will be examined by means of field studies on corpses and live respondents in areas with varying levels of the elements in the drinking water.

R803804 01

The overall objective of this project is to study an infiltration-percolation system of land disposal as a practical means of upgrading secondary effluents, particularly from wastewater stabilization ponds in the upper Great Plains Region. Three pilot infiltration basins of approximately 1/6 acre each with underdrains will be used for this investigation. The project will specifically determine the effectiveness of the infiltration-percolation system to upgrade existing secondary treatment to meet effluent standards for BOD, suspended solids, and fecal coliforms while removing phosphorus and oxidizing ammonia nitrogen to nitrate to meet new ammonia standards. Acceptable loading rates for both scarified and undisturbed soil will be determined, and winter operating constraints imposed by cold weather conditions will be identified.

The overall objective of this project is to develop a comprehensive mathematical model which provides a rational design method for feedlot pollution control facilities. The design of an optimum feedlot pollution control system will consider the historical rainfall and temperature records of the location in question, the free water evaporation rate, the ability of local crop land to accept runoff, as well as applicable pollution control regulations. The output of an effective design procedure is the retention pond volume, irrigation system capacity, and land area required to meet various degrees of pollution control.

The first step in accomplishing the objective has been to develop and demonstrate a computerized technique to integrate the physical factors listed previously in such a way as to predict the effectiveness of various combinations of runoff handling components. This is being done for five representative climatic regions.

The second phase of the project will be devoted to economic optimization of the system to identify the least cost design for particular locations. This phase will consider land construction, equipment, power and management costs.

When completed, this project will be summarized in design techniques usable by feeders, design engineers, and regulatory officials to provide desired levels of pollution control at the lowest possible cost.

S803828 01

The primary objective of this demonstration is to demonstrate the technical and economic feasibility of composting raw dewatered municipal sewage sludge by high rate suction aeration under the adverse climatic conditions typically experienced by many of the municipalities located in the New England, Great Lakes, Midwestern, and Northwestern states. Secondary objectives consist of a wide range of operational and procedural elements all related directly or indirectly to the physical location and climatological conditions of this demonstration.

The sludge will be delivered to the site once per week at a volume of approximately 50 cu.yd. Upon arrival at the site wood chips are mixed with the sludge at a ratio of 3:1, wood chips to sludge by volume. The mixture is then moved to the composting area which is a concrete pad with two twenty foot lengths of pipe connected to a blower. The blower operates at two minute intervals every twenty minutes. The blower draws air through the mixture and assists the composting pile in achieving higher and more even temperature distribution. The wood chips absorb moisture and create voids which also assist in the thermal distribution and assist in keeping a constant oxygen content. Temperatures must exceed 55 degrees Centigrade throughout the pile to insure complete pathogen kill. Therefore, temperature and oxygen content must be monitored daily. The entire process takes approximately fourteen days. An additional thirty days of curing after the pile is removed from the blower area is recommended before use, as the pile will continue to compost naturally. The final product is useful as a supplement to commercial fertilizer and can assist in lowering the cost of maintaining public land. Also the disposal of sludge is eliminated and if successful this process will eliminate the need for expensive digesters presently used in secondary waste water treatment plants.

The demonstration will commence in May 1975 and terminate in April 1976.

R803834 011

Examine the use of potassium ferrate as an oxidant for the measurement of total oxygen demand (TOD). Compare effectiveness of potassium ferrate to presently used potassium dichromate. Investigate the effectiveness of potassium ferrate as an oxidant for ammonia and organic compounds. The study should result in a determination of the feasibility of a new method for TOD.

R803842 02

The overall objective of this research effort will be to identify metabolites and breakdown products of malathion, parathion, diazinon, methyl parathion, and methoxychlor during incubation in natural and sterile seawater of varying salinity and temperature. This is a continuation of EPA Grant No. R 803842 which began 15 June 1975.

R803846 02

Task I - Determine fate of aromatic hydrocarbons in the atmosphere and their contribution to smog formation. The specific objectives are to determine the products of the reactions of OH with toluene and related compounds and to determine the rate constants for the reactions of p-cresol, one of the products, with OH and ozone. The OH is generated in a flow system by reacting H atoms, formed by decomposing H_2 in a microwave discharge, with NO_2 . To this is added the organic substrate and oxygen. Analysis is by gc and gc-ms. Task II - Evaluate the importance of the reaction of HO_2 with simple olefins in the atmosphere. The products and rate constants for the reactions of HO_2 with simple olefins, such as ethylene, propylene, and isobutylene will be evaluated using the reaction of 1,4-cyclohexadiene and oxygen as the source of HO_2 .

R 803 851

Aerosol size distributions are being measured in St. Louis as part of EPA's Project MISST, using aircraft and ground-based self-contained mobile laboratories. These measurements are being made in conjunction with a complete array of chemical, physical, and meteorological measurements. In conjunction with other collaborators on the team, new models for the conversion and transport of secondary aerosols are being developed.

Also, experiments on the generation of sulfate aerosols from SO_2 , NO_x , hydrocarbon, and heterogeneous aerosols are being conducted in a laboratory smog chamber.

New instrumentation for the in situ, continuous measurement of sulfur-containing aerosols is being developed and applied in the field.

Trimodal aerosol models are being used to characterize these atmospheric aerosols, and the resulting parameters correlated with other chemical and meteorological measurements. This work has already resulted in new understandings and characterization of atmospheric aerosols.

Efforts will also continue to develop procedures for handling large quantities of multivariant air pollution data using a special laboratory computer system.

R803859 02

The objective is to develop and validate models for assessing direct or indirect impacts of alternative ("non-persistent") pesticides (insecticides and herbicides) on various ecosystems. Short-term objectives include model development and field and lab studies to parameterize the models; and apple orchard and the associated watershed have been chosen as prototypes for sampling and modeling.

The approach includes literature surveys, preliminary modeling, development of computer simulations, sensitivity analysis and parameterization, and laboratory and field studies to determine data shown to be unavailable. Over the longer term, field validation and generalization to other terrestrial ecosystems are planned. Up to twelve pesticides will be studied, with emphasis depending on early findings.

Field data on pesticide distribution and dynamics are being taken; biota are being sampled; models are being developed; laboratory experiments are being set up.

R803872 02

The objectives of the research are to define effects of continuous exposure to chlorine on larval development, juvenile growth, and reproductive parameters, for two selected marine decapod crustaceans, Panopeus herbstii and Pagurus longicarpus. Additionally the effects of chlorine on development of the coot clam, Mulinia lateralis, and blood serum constituents of the blue crab Callinectes sapidus will be studied. Preliminary data suggest that responses occur only at chlorine doses close to the lethal concentration. Reliable test systems developed to date will be used to define chlorine effects.

S 803 873

The additional EPA funds will allow continued pursuit of the objectives of the grant as detailed in the approved grant three-year scope of work.

R803875 01

Objective - (a) to assess the energy conservation impact of point source treatment by high temperature hyperfiltration membranes and the direct recycle of renovated hot process water and the corresponding reconcentrated solutions of chemicals, and (b) to obtain engineering data on the performance of high temperature hyperfiltration membranes by testing at selected field-sites.

Approach - (a) The impact assessment will be developed by analysis of the details of full-scale manufacturing operations selected to be typical of procedure in wide-use in the textile dyeing and finishing industry. (b) The engineering performance data will be obtained employing skid-mounted test units equipped with commercial prototype high temperature hyperfiltration membrane units. The tests will be conducted at field-sites with continuous sample wastestreams from full-scale product operations. The on-site testing will facilitate the direct involvement of industrialists in the evaluation of the direct recycle of the renovated wastewater and concentrated residues.

Plans - The assessment of the energy impact, along with laboratory evaluation of hyperfiltration (a screening test phase) will be carried out during summer and early fall of 1975. On-site testing and evaluation will begin by the winter of 1976, with completion during the summer 1976.

R803882 02

The manual of practice will set out the rationale in pre-mining site evaluation so that mining and reclamation will be done in a manner so as to not only comply with existing and proposed state and federal mining programs but ensure minimal environmental damages. The site evaluation will include the evaluation of the soil and rock properties, surface and ground water resources, physical and cultural features, and methods of mining and reclamation. It will consider the geological and hydrological setting prior to mining as the basic inputs to the pre-mining planning. The manual of practice will provide guidelines and means of assessing alternatives in the areas of water management, land use planning, and surface mine engineering, and will be mostly based on information gained from literature review and critical evaluation of methods as reported in the literature and applied in the field. The M.O.P. shall recommend methods, techniques and alternatives for selecting and designing mining systems to achieve soil handling and storage, and overburden handling, segregation and disposal. It will be presented in an orderly and concise manner. Liberal use of charts, maps, graphs, diagrams and photographs will be made to substantiate the description.

The Manual of Practice (M.O.P.) will be designed to assist mine operators and control personnel in developing, evaluating and selecting mining and reclamation plans that will be least detrimental to the environment, prior to the commencement of mining.

R803885 01

Objectives - To determine the effects of pesticides of various chemical types on the humoral and cellular response in experimental animals.

Approach - Animals will be immunized against a hapten of known structure. Comparisons of the immune response will be made in control versus pesticide-treated or immunosuppressed animals.

R803889 01 0

An Engineering Guide is proposed to assist in standardizing construction, operation, maintenance and monitoring features of waste injection systems. The proposed Guide will encompass the entire spectrum of waste injection beginning with site evaluation through system design, operation and maintenance, monitoring, abandonment, and regulation. The Guide is to provide recommended standards for "in the field" use as well as a basis for state and federal regulations, if necessary.

The Guide and accompanying report on abandoned wells will be designed to meet the following major needs:

- 1) to serve as a field applications and design manual for waste injection systems, emphasizing all design and construction features relating to the potential pollution of the ground-water resource.
- 2) to serve as a comprehensive source of technical information on all aspects of waste injection systems.
- 3) to serve as the first comprehensive report on current practices of well abandonment, their impact on water supplies, and the methodology necessary to correct the situation in the future.

R 803 896

The objective of this program is the determination of the fate of anthropogenic SO₄, i.e., the rate of sulfate formation and the rate of removal of SO₄ to the ground. During this budget year, individual power plant plumes, urban plumes, and plumes from power plant complexes will be studied.

R803908 02

The object of this study will be to define the problem associated with the clay slimes produced by the washing of sand and gravel, to determine if improved operation and reclamation of recirculation ponds is feasible, and to seek alternative means of disposal of clay slimes. Major tasks to be conducted are: (1) characterize the clay-slime dewatering problem, (2) investigate methods for more efficient utilization of slime storage ponds, (3) investigate methods for ultimate reclamation of storage ponds, (4) investigate mechanical/chemical alternatives to ponds, (5) investigate process modifications to minimize slime handling and (6) seek other treatment alternatives.

S 803 911

The proposed study is intended to evaluate the performance of the newly installed extended aeration and aerobic pond systems for the treatment of salmon processing waste water. The systems will be examined at various operation conditions. The results will be analyzed to determine if the control efficiencies of the systems are adequate to meet the subject process waste effluent limitations (operational modifications will be made in order to improve systems performance when necessary). Meanwhile, treated water quality will be evaluated to determine its feasibility for salmonid propagation that is intended in the near future by the council in order to complete the turnkey operation-salmonid propagation and processing. This type of investment will improve employment opportunity and economy of the tribal community.

Both extended aeration and aerobic ponds systems constructed near the council's salmon processing plant in Shelton, Washington, provide the flexibilities for flow bypassing and adjustments. These flexibilities will allow the investigators to evaluate the systems at various conditions. The results will be reduced to useful forms. The engineering criteria will be derived/documented for future design application. These design criteria derived will be very useful and extremely important to fish processing waste control due to the lack of data available to date.

R803913 02

Toxaphene is used in larger amounts than any other chlorinated hydrocarbon insecticide yet there is insufficient information on its composition and toxicology. Studies are in progress to intercompare the composition of 22 samples of toxaphene and related chlorinated terpenes as follows: 8 samples of Hercules toxaphene manufactured from 1949 to 1975; 6 samples of toxamphene-like materials manufactured by other United States companies and 6 samples manufactured in other countries; two radiolabeled toxaphene preparations. These determinations involve elemental composition, spectral comparisons, toxicological evaluations, and component analyses by combined thin-layer chromatography and capillary column gas-liquid chromatography. Improved methods are also being developed to obtain several hundred milligrams of 2,2,5-endo, 6-exo, 8,9,10-heptachlorobornane (compound B) for use in chemical degradation and toxicological studies. Quantitative studies will evaluate the content of compound B and a related octachlorobornane (compound A) in each of the 22 toxaphene-like materials. Studies are continuing on the isolation of additional toxic components from toxaphene. Attempts will be made to define the metabolic fate of compound B in rats, houseflies and appropriate enzyme systems as the first step in understanding the environmental fate of this model toxaphene component.

R 803 914

This project will deal with the mammalian metabolism of representative ethylene-bis-dithiocarbamate and dimethyldithiocarbamate fungicides and their major breakdown products. In addition, the ability of these fungicides and their major breakdown products to inhibit mixed function oxidase enzyme activity in the liver, testes and adrenal will also be examined. Finally, the ability of ethylene thiuram monosulfide (ETM) to produce hypertrophy of the thyroid gland will be examined. ETM, along with ethylene thiourea (ETU), are major breakdown products of the ethylene-bis-dithiocarbamate fungicides. The anti-thyroid effects of ETU have been clearly established. It remains to be seen if ETM has similar anti-thyroid activity.

R 803918

Objectives - To determine by epidemiologic and supportive laboratory studies the health effects of consuming barium in Illinois drinking water exceeding the recommended drinking water standard of 1.0 mg/liter. Particular emphasis will be given to see if barium consumption is associated with cardiovascular and renal disease and the prevalence of hypertension.

Approach: (a) Mortality rates will be retrospectively examined for statistical differences between deaths attributed to cardiovascular diseases in communities in Illinois with elevated barium levels in their drinking water supplies and the National and State averages. Diseases examined will include hypertension, ischemic heart disease, peripheral vascular disease, cerebrovascular disease and renal disease. (b) A household morbidity study will be performed on an exposed population. Morbidity rates will be compared with the National and State averages. The exposed population will be subjected to blood pressure measurements and a questionnaire. Tap water samples from households will be analyzed for trace metal composition. 3. Progress: We have identified those Illinois communities above the standard of 1.0 mg/liter. We have acquired Illinois State Death Certificate Tapes from which mortality rates will be examined. We have made initial contact with the communities involved in the morbidity study. We have developed and pretested the questionnaire, trained our interviewers, and are currently in the field collecting household morbidity data. Analysis of tap water samples is also in progress.

R803937 02 0

Objective - To Determine the inorganic components which are leached from western coal stored at a loading facility on the Great Lakes. This is a part of an overall study which investigates leachable organics and particulate as well.

The purpose of the proposed research is to confirm and complement results obtained from previous studies on sanitary landfill stabilization with leachate recycle by developing two controlled prototype landfill disposal cells, filling them with ground municipal refuse, and providing for leachate containment and recycle and monitoring of pollutant flux, gas production and composition, and evapotranspiration influences with time.

The purpose of the research effort will be accomplished over a 3-year project period during which time rates of stabilization, leachate generation, gas production and rainfall infiltration will be recorded for the two landfill cells with one open to receive rainfall and the other sealed to permit gas collection and measurement. Ground municipal refuse will be used to fill the cells and digested sludge will be mixed with the refuse during filling to provide initial moisture, nutrients, seed and buffer and to encourage immediate compaction under a static load. Each cell will be lined to contain leachate for recycle and appropriate underdrains and leachate recirculation facilities will be provided.

The refuse-sludge mixture will be analyzed and characterized both at the beginning and end of the project period. Leachate samples will be collected periodically and analyzed for both organic and inorganic constituents; gas analyses will be performed to determine the quantity and rate of methane generation with time.

It is anticipated that the results of this research will permit a more adequate determination of the relative merits of leachate recycle as a viable solid waste management option.

S 803 956

The objective of this project is to identify specific techniques for controlling the erosion which naturally results when land is disturbed and altered during the construction of access roads to coal mining operation in the steeply sloping areas of Appalachia and to obtain quantitative data for evaluation of the effectiveness of the erosion control methods.

The scope of the project is:

- (1) To compile and examine various erosion control techniques that are applicable to coal mine haul roads;
- (2) To select specific erosion control techniques for demonstration and to measure the relative effectiveness of each by installing the selected techniques in the field on a haul road and measuring their relative effectiveness using on-line monitoring instruments and equipment;
- (3) To assimilate, evaluate, and interpret the collected data and prepare a report describing the results of the demonstration and to make specific recommendations about these techniques for future incorporation in guidelines concerning haul roads.

R803979 01

Assistance is requested for the running of the International Conference on Heavy Metals in the Environment to be held in Toronto, Canada from October 27-31, 1975. The conference is designed to be a high quality scientific meeting involving academic, government, and industry scientists working in the many areas of heavy metal concern. The four subject areas are 1) analytical techniques and standard setting, 2) pathways and cycling of heavy metals in natural and man-made ecosystems, 3) human health, including toxicity, sub-lethal effects, epidemiology, and 4) regulatory problems. A joint USA-Canadian committee is organizing the conference. Approximately 55 eminent scientists have been invited to present papers or to take part in panel discussions. In addition, 200 abstracts have been received to date for contributed papers. An attendance of 1000 is expected. The objective is to create an atmosphere for interdisciplinary exchange and a forum for up to date presentation and discussion of the state of the art. Through this, it is hoped that more rational strategies can be developed for control of heavy metal problems, especially in the area of standard setting. It is also hoped to focus on important present problems, probable future concerns and palliative approaches. The international flavour of the conference should ensure its usefulness - present indications are for scientists from more than 30 nations to attend. WHO is to assist in further publicity in Latin America. A symposium volume will be produced by spring 1976.

R803988 01

The effectiveness of lime and hydrous oxide liners for controlling the migration rate in solution of selected trace elements (As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Se, V, and Zn) at various flow rates through soils will be studied. It will be a laboratory scale study using columns of disturbed soil for screening of lime, hydrous oxide (Fe), and solution flux treatments identified in a previous study of soil attenuation of municipal landfill leachate pollutants.

A model will be developed which relates pollutant attenuation by landfill liners to easily measurable properties of the physical system.

A final report detailing procedures, findings, conclusions, and recommendations will be prepared.

The objectives of this proposal are: (1) to establish analytical values for citrus waste activated sludge dried by the Carver-Greenfield process for trace minerals, sulfur amino acid, lysine and metabolizable energy. (2) to determine the degree of interaction between citrus sludge and vitamin D₃ in broiler diets. (3) evaluate the biological availability of phosphorus contained in citrus sludge. (4) evaluate the protein quality of the citrus sludge.

D023000 01

Objectives: Determine optimum conditions under which flue gas desulfurization sludges can be combined with municipal sludges to produce fertile soil.

Approach: Initial bench-scale test work will be conducted to determine which combinations of flue gas desulfurization sludges and municipal sewage sludges can be stabilized. The degree of stabilization will be determined by penetrometer hardness readings, supplemented by unconfined compression testing of selected samples.

Mixtures of flue gas desulfurization sludges and municipal sewage sludges responding to stabilization will be seeded with grass, legumes, etc. to determine their **ability to support vegetation.** **These tests will be conducted indoors under "greenhouse" conditions.**

Selected synthetic soils will be tested for permeability, leachate quality, and their ability to retain nitrogen, phosphorus, and potassium.

Following completion of the bench-scale test work, outdoor test plots of the most promising synthetic soils will be established to demonstrate their potential as fertile soil capable of supporting vegetation.

A comprehensive report will be written summarizing the results of the study, and recommendations will be made for full-scale field demonstration projects where the synthetic soils may be used alone or as a soil amendment.

Current Plans:

1. Literature survey, June-July, 1975
2. Bench-scale stabilization tests, June-December, 1975
3. Greenhouse vegetation tests, September, 1975 - June, 1976
4. Outdoor test plots, June - September, 1976
5. Final report issued by the end of November, 1976

The objective of this project continuation is to develop the technologies in the utilization of solid waste as a fuel in combination with coal so as to provide guidance for energy recovery from solid waste in such a manner as to reduce the environmental impact of solid waste disposal and the emissions from coal-fired power plants.

The approach is to evaluate gaseous and particulate emissions, plus corrosiveness of the combustion products as a function of solid waste to coal ratio, and as a function of sulfur content of the coal. Also, refuse processing variables and methods of feeding refuse into the furnace will be evaluated. This various experimental parameters will be explored in an operating power station through the cooperation of the City of Columbus, Ohio.

During the first year, research methods were explored for feeding semi- and fully processed solid waste into the Columbus, Ohio, municipal light plant boiler furnaces using commercially available agriculture-type conveyors and blowers. Boiler tube corrosion data obtained when 15 and 35 percent refuse (Btu basis) was added to 3 percent sulfur coal, show no increase in corrosion rates at the 15 percent refuse level. Also, stack emission studies indicate a significant reduction in sulfur oxide emission when refuse is burned with high sulfur coal. Furthermore, examination of the ash revealed no unburned solid waste. It is planned to expand the program to longer term operations to permit confirmation of the above results and to determine the relative merits of higher refuse to coal ratios in terms of corrosiveness of combustion products emission characteristics and combustion behavior. It is planned to replace the temporary refuse handling system with more rugged equipment for long-term operations.

R804011 01 0

The XV International Congress of Entomology is to be held in Washington, D.C. August 19-27, 1976. Thirteen subject sections are to be represented. These are: Systematics; Genetics; Physiology and Biochemistry; Toxicology; Ecology; Behavior; Social Insects and Apiculture; Biological Control; Medical and Veterinary Entomology; Agricultural Entomology and Pest Management; Forest Entomology; Stored Products and Structural Insects; Pesticide Development, Management and Regulation. First announcements were sent world-wide requesting interested parties to write for additional information. More than 2000 persons have requested second and final announcement to date.

R804016 01

We propose to interface laboratory submodels describing pesticide volatility and degradation to field pesticide attenuation data. The submodels and data will be supplied by SERL and the work will serve as an input to the pesticide and Nutrient Runoff Models currently being developed by SERL.

The digital computer program (compiler) MLAR, developed by GARV Knotts at NIH, shall be used as an integral tool for testing models. Each model will be tested against field data in order to establish the feasibility of employing in the model the parameters calibrated with laboratory data.

In the initial model, it is assumed that microbial degradation obeys a hyperbolic rate equation and that attenuation processes other than microbial are independent and additive. Moisture, rainfall and temperature dependences are incorporated.

R 804 033

The objective is to initiate measurements on both the vertical and horizontal concentration distributions of halocarbons in the troposphere and lower stratosphere which are present or suspected to be present in the atmosphere. Determination of the concentrations of the halocarbon species and their reaction products will be accomplished by the methods of electron capture-gas chromatography and gas chromatography-mass spectrometry. Samples will be collected by aircraft flights and at selected ground stations in the United States.

R804102 01 2

The overall objective of this project is the modification, calibration and verification of mathematical models that use input information (e.g. nutrient, pesticide, and soil properties; management practices; watershed characteristics; and climatic factors) and predict concentrations and losses of nutrient and pesticides in surface runoff. Over a thirty month period, numerous samples of surface runoff will be collected and nutrient (nitrogen and phosphorus) and pesticide concentrations in both the sediment and water fractions will be determined. Soil profiles of watersheds (20 acres) in corn and soybeans (fertilized and treated with pesticides) and in grass (fertilized 2 out of 3 years) will be sampled periodically and the samples analyzed for nutrients and pesticides to provide source data. In the case of pesticides this data will be used to calibrate and verify the pesticide transport and runoff model (PTR) already developed. The data for nutrients will be used to develop, calibrate and verify the companion nutrient transport and runoff model. Sediment transport models will be developed and tested as a part of the transport system.

In addition, flow, sediment, nutrient, and pesticide levels will be monitored at a stream controlling a 19.5 mi² watershed which includes the three field-size watersheds of interest. Four intra-basin stations upstream from the main station will also be located and monitored during selected runoff events. This data along with inventory data of farm management practices within the large watershed will be used to evaluate the effect of overland flow and channel processes on the transport of agricultural chemicals.

R804126 01 0

To assess the potential practical utility of microwave degradation of wet municipal wastes by means of a rigorous technicoeconomic analysis. To establish mode of microwave degradation of cellulose to characterize the gaseous and liquid products and determine their value as chemicals or use as fuel.

R804162 011

The objective is to develop a method of predicting potential ground-water degradation in strip coal mining on the basis of the mineralogy of the overburden. The mineralogy of similar material that has undergone extensive chemical weathering in old spoil piles. The ground-water degradation that has resulted from leaching through the old spoils will also be determined qualitatively and quantitatively. This field-oriented, cause-and-effect approach will help to establish the relationship between the mineralogy of overburden and potential ground-water degradation.

884164

A number of metallic ions - chromium, copper, cobalt, mercury, molybdenum, nickel etc., interfere in the determination of total arsenic by the silver diethyldithiocarbamate (Standard Methods, 1971). Usually these ions are present in low concentration in natural waters and pose no problem, but in the industrial waste discharges, the concentration of these ions is intolerable for the accurate evaluation of arsenic.

The proposed research will study the range of ionic interfering and will develop a method for quantitative separation of arsenic from such ions. Two approaches will be tried for eventual selection of one.

I. The arsenic will be reduced to arsenic (III), trichloride by cuprous chloride in the hydrochloric acid solution. The arsenic (III) trichloride will be separated by distillation and arsenic determined in the distillate by SDDC (Standard Methods, 1971).

II. Arsenic will be oxidized by nitric-acid and potassium bromide and the excess oxidant destroyed by evaporation to dryness. The residue will be dissolved in dilute hydrochloric acid. Arsenic will be separated by eluting this solution through a column of cation exchange resin in the hydrogen form. The arsenic will be determined in the purged liquid by the SDDC method (Standard Methods, 1971).

R804168 01 0

Although many adverse consequences of undue lead exposure and absorption in children have been documented, little is known about changes in blood lead concentrations, body burden of lead and/or susceptibility of the infant and developing child to exposure of lead during gestation as well as to subsequent environmental lead exposure. Numerous dietary factors are also believed to contribute to the total problem of elevated pediatric lead absorption. Iron deficiency, one of the most common forms of malnutrition among infants and preschool children in the United States, and low dietary calcium intakes may increase the potential toxicity of elevated blood lead levels in the young and growing child. This longitudinal study will examine relationships between environmental sources of lead; dietary intakes of lead; intakes of iron, calcium and other nutrients; and biochemical measurements of lead, erythrocyte protoporphyrin, hemoglobin and hematocrit, serum iron, total iron binding capacity, and serum calcium in a population of healthy infants during the first two years of life.

S 804 174

Objective: To establish the feasibility of a continuous electrolytic treatment process to reduce the oil content of oily emulsion wastewater from machining operations to acceptable levels for discharge, without generating the large quantities of watery sludge requiring disposal which are common to conventional chemical treatment processes.

Approach: Demulsification will be accomplished by passing the oily wastewater through permeable electrodes. Bench scale experiments have shown that the oil content of waters containing several thousand ppm of emulsified oil can be reduced to a few ppm in a flow system at practical rates and at very low power cost. The floating oily sludge produced is high in oil content and low in water content, so that compared to chemically produced sludges the sludge volume to be handled and disposed of is small, it can be separated from the water phase by flotation and skimming rather than by sedimentation, and recovery of the oil resource is more practical.

Current Plans: In the first year, it is planned to construct, develop, evaluate, and demonstrate a pilot unit (1500 gpd) to treat actual oily wastewater from the machining operations at a manufacturing plant.

R 804 190

A study is proposed in which researches will be conducted to (1) model the performance of the EPA Dichotomous Sampler and (2) employ the Low Pressure Impactor (LPI) system. Basically, the modelling of the EPA sampler will consist of experimentation to characterize the effects of the critical design parameters upon sampling efficiency and internal losses. The end result of this effort will be establishment of optimal design criteria which can be used in future instrument developments wherein it may be desired to employ the dichotomous principle for samplers with other flow rates and particle cut-points.

The LPI system will be used in studies of the size distribution and concentration of lead particles in the atmosphere. Because of its capability to fractionate airborne particulate matter as small as 0.05um in diameter, the LPI can be used to provide experimental evidence on the nature of lead aerosols in environment.

S 804 191

The long-range objective of the Lake Apopka, Florida, restoration program is to restore the quality of the lake for recreational use.

R 804 200

I propose to study the effect environmental contaminants--particularly at sub-clinical doses--will have on cell-mediated immunity and to explore possible mechanisms of alteration by observing characteristics of macrophages and lymphocytes. Several different cell-mediated tests will be utilized and subclinical doses of the contaminants will be administered. Lead will be examined initially, but the effect of other heavy metals and insecticides will be measured should lead alter the immune response in mice.

Lead acetate will be administered in the drinking water of mice for prolonged periods so there will be a gradual accumulation simulating natural conditions. Kidneys will be analyzed for content of lead to determine actual concentration and histopathology will determine alterations that may occur from exposure. We will endeavor to ascertain the effect lead, etc., has on: migration of macrophages via direct or indirect sensitization of mice with *Bacillus Calmette-Guerin* (BCG); possible decrease of phagocytosis by macrophages via measurement using opsonized sheep red blood cells (SRBC); possible suppression of T lymphocyte activity by injecting footpads and measuring CMI; possible suppression of T cell helper function.

If low levels of environmental contaminants render the host more susceptible to cell-mediated immunity, then permissible levels of these compounds for humans should be re-examined.

R 804 201

The objective of this grant is to study the effects of sized asbestos fibers on a number of physiological properties (that is DNA structure, function and maintenance, membrane structure and function, and metabolic regulation, kinetics and control.)

R804204 01

The objective of this research is to standardize and implement a mutagen testing procedure, which is both sensitive and reproducible. Since there exists strong correlative evidence linking mutagenicity with carcinogenicity, the importance of screening chemicals found in the environment for mutagenicity cannot be overemphasized. We have chosen a bacterial system, employing sensitive strains of *Salmonella typhimurium*, for the mass screening of new compounds, on the basis of its simplicity and economy, as well as its potential sensitivity, and reproducibility. Our approach is to correlate the back mutation, specific locus test, designed by Bruce Ames, with a non-specific locus, forward mutation assay, which will be developed in the course of this project. This system, once developed and standardized will be utilized to investigate initially those compounds found in the New Orleans water supply. This area is of particular interest, since there appears to exist a strong correlation between water pollution and the occurrence of human cancers in the region.

S 804 208

The purpose of the project is to develop and implement portions of a capital improvement program for these portions of the Sultan Basin draining into Lake Chaplain and Spada Lake, to rehabilitate the water quality of these lakes to a more natural condition in conformance with federal and state water quality standards and classifications. This program will involve watershed regulations for land uses, construction of non-point source control and abatement practices, closure of a portion of the watershed, water filtration and/or other source protection measures in compliance with PL 92-500, 93-523, WAC 298-54 and other applicable state and federal standards.

To effect the necessary watershed management and pollution control, this project will be broken down into four major elements: 1) management planning; 2) promulgate regulatory authorities; 3) facilities implementation and 4) project evaluation.

The present status of the project is that of a waiting-funding from the Environmental Protection Agency under Section 104(h) of PL 92-500.

R804217 01

Objectives - To develop apparatus and procedures for measuring in-situ growth and survival of planktonic populations and the in-situ rate and nature of surface colonization by epibiotic populations and to test them as indexes of environmental stress by pollutants in estuarine and nearshore waters.

Approach - a. To observe the seasonal sequence of phagotrophic microorganisms occurring in the plankton and on surfaces in order to determine possible indicator species to be used in the culture and colonization studies below. b. To develop standard and simple procedures for the measurement of the in-situ growth, survival, and colonization of marine microorganisms based on our previous studies on diffusion culture and fouling. c. To use the above procedures to determine their suitability as simple in-situ monitoring systems to detect subtle effects of environmental stress by pollutants from known polluting sources and in artificially stressed ecosystems.

Current plans - Diffusion culture of bacterioplankton has been developed to a stage where the influence of pollutant stress can be studied. Observations of phagotrophic populations on various surfaces have been made and now selected surfaces can be evaluated as substrate standards. Routine observations by the Co-Investigator indicate that adequate planktonic phagotrophs occur seasonally to provide a source of material for study.

S 804 222

1. Methods directed at the elimination of reduction of incoming nutrients and/or sediments;
2. Methods directed toward the improvement of in lake conditions.

S 804 231

The proposed project would reverse deterioration of an important recreational lake and contribute both to the economy and quality of life in Freeborn County.

S 804 232

Work involves a \$1.6 million restoration project for eutrophic Lake Lansing, used by 500,000 people. Major objectives include: testing and monitoring effective innovative dredging methods including new cutter heads, hydraulic head loss and consolidation rates for marl, peat, etc. Methods of reducing return to lake of silt and nutrients. Prepare cost curves on dredging process including size, depth, lake location, spoil areas etc. and do likewise for a rational assessment formula to aid future engineers and contractors. These are to determine economics of storing dry peat and marl for agricultural resale. Demonstrate sandy beaches construction and also document the relationship of dredging to improvement or water quality.

The approach entails superimposing an evaluation program into an innovative dredging program for Lake Lansing. As dredging proceeds, appropriate physical and chemical monitoring would be made using in-house laboratory and soils equipment. Principal investigator will prepare plans and specifications, take bids and then give detailed resident project supervision concurrent and in part with the same personnel, evaluating the project. The project would take 6 months for final plans, 18 months for constructed plus 6 months for evaluation report.

Objectives - A pilot study program for the purpose of evaluating reverse air and pulse jet-type baghouses is being contemplated at the Nashville Thermal Transfer Corporation's solid waste energy conversion plant in Nashville, Tennessee. The primary objective of the study is to establish a bag material which can withstand the heat, corrosion and abrasive environment created by the incineration of solid waste while removing submicron particulate from the gas stream. Recently developed fabrics will be tested for improved endurance and baglife expectancy. In addition, the efficiency of particulate removal and air-to-cloth flow ratio will be studied and, finally, an economic evaluation will compare the capital and operation costs of each baghouse with alternative and comparable pollution control systems.

Approach - The prototype will clean actual flue gases taken from the existing system. Flue gas volumes between 3,000-6,000 CFM will be cleaned in each baghouse. The test will be conducted in a minimum of 3 major stages, namely endurance, performance and laboratory testing. The endurance test will consist of sample bags operated continuously under normal conditions for approximately 4 months. The continuous exposure of the bag materials to the flue gases will be followed by laboratory testing of all bags. Four independent laboratories will conduct destructive and non-destructive tests to determine fabric deterioration rate and project bag life expectancy. Bags which survive the endurance test will be augmented with a full complement of new bags and tested for cleaning efficiency and overall performance at various air-to-cloth flow ratios. Results from this test will also provide data for the economic evaluation and final report which will follow the conclusion of all testing.

Current Progress - The first pilot baghouse was received on site and is being erected. The second pilot baghouse is scheduled to arrive the third week of July and be erected by 1 August, 1975. The endurance test is thus scheduled to begin on or about 25, August, 1975.

S 804 234

This plan is a comprehensive lake management program which encompasses a series of separate projects, all of which are interrelated to maximize the recovery of the lake.

S 804 235

The major restorative action proposed for the lake is for dredging 780,000 cubic yards thereby deepening the lake by an average of five feet. Alum then will be applied to minimize nutrient outflow from the bottom sediments.

S 804 237

The proposed restorative action for both lakes to divert the storm drainage from the town of Waupaca to the Waupaca River.

S 804 238

The objective of the project is to prevent further deterioration of water quality of White Clay Lake, Wisconsin, by construction of up-stream control facilities on dairy farms, combined with some stream bank and lakeshore improvements.

S804250

The project will demonstrate the applicability of a small-scale dredging program coupled with a comprehensive watershed "housekeeping plant and the construction of a holding basin to intercept stormwater runoff.

S804251

The objective of the project is to rehabilitate Hampton Manor Lake by increasing its depth and removing rooted aquatic plants. The lake, approximately 8 acres in surface area, is located in the town of East Greenbush, Rensselaer County, New York.

S 804 252

To improve the water quality of Washington Park Lake in Albany County.

S804253

The objective of the project is to improve the water quality of Buckingham Lake in Albany County, New York, which has a surface area of 4.5 acres.

S804254

The objective of this project is to develop a comprehensive mangement plan when implemented, will control waterborne pollution to Delaware Park Lake and North Bay, a lake system in Erie County, New York, with a surface area of 29.5 acres.

S 804 260

The objective of the project is to restore the water quality of two lakes in the Minneapolis Chain of Lakes, Minnesota, Lake Harriet and Lake of the Isles.

S804272 01 0

To control or change the trophic status of a small lake through the use of a planktonic feeding fish is the main objective of the project.

The approach is to utilized sea-run alewives in a controlled condition which precludes the development of a problem on an inland lake. The life history of the fish will prevent any problem of natural reproduction in fresh water.

The current plans in progress for the last two years is the collection of background nutrient data and discussion of the project plans with various agencies concerned.

R 804 278

The objectives of this project are to gain a better understanding of atmospheric turbulence in the region between 100 meters and 300 meters of the planetary boundary layer, and to update and extend techniques for predicting atmospheric dispersion in the planetary boundary layer.

R804291 01

To determine the relationship between different dosages of H_2SO_4 aerosol (continuous and intermittent exposures) and both visible and subtle effects on some important crop and tree species; to develop and describe the range of visible symptoms induced on different plants by the acid aerosol; to determine the environmental conditions under which maximum injury is observed and to develop a catalog of plants sensitive, intermediate and resistant to H_2SO_4 aerosol based on comparative response.

Plants will be raised under greenhouse conditions and at different stages of growth, will be exposed to different concentrations x durations of H_2SO_4 aerosol in special tubular, all-glass exposure chambers. The system will allow simultaneous exposure of one branch of a plant to the aerosol in an exposure tube and the opposite branch of the same plant to water vapor in another exposure tube (check). H_2SO_4 aerosol will be generated through a positive air pressure system mixing water-saturated filtered air with SO_3 .

Parameters such as temperature and relative humidity will be controlled and monitored continuously. Acid aerosol concentration will be measured about every 15 minutes using an ultrasonic transducer--Coulometry System through Gran's plots. Data will be acquired through a computerized acquisition system and will be analysed with a CYBER-74 computer. All facilities except the tubular glass exposure chamber are available at this time at the University of Minnesota.

Last phase of the study would involve the determination of the response of acid aerosol sensitive plant species, to simultaneous exposure to threshold dosages of H_2SO_4 aerosol and varying concentrations of NH_3 . Environmental conditions used will be congenial for acid aerosol injury.

R804293-01

The objective of this investigation is to demonstrate a process for the removal of DDT and related products from DDT manufacturing wastes currently discharged to a class I landfill, and their subsequent treatment. This waste is the only DDT-containing effluent from the DDT plant following earlier installation of a process water recycle system. With the development and demonstration of the subject program, the new discharge of DDT and related materials to the landfill can be reduced to essentially zero.

The program consists of three phases. In the first phase, bench-scale studies will be made to select the best means for extraction of the DDT from the caustic waste, utilizing the principles discovered by Chemico Process Plants Company - Envirogenics Systems on EPA Contract 68-01-0083. The Chemico-Envirogenics group, as the major subcontractor, would continue its studies at 1-2 gpm bench-scale levels, and also would consider means for DDT disposal. Later phases consider 10-15 gpm pilot plant development and up to 100,000 gpd demonstration of the completed process.

R 804294

The study will determine accuracy and precision data for a variety of pesticides in surface and drinking water. The official EPA method using liquid extraction and gas chromatographic techniques will be employed.

S 804 306

1. Objective: To attain 100% recycling/reuse of process water used in the manufacture of hardboard by the wet process system.
2. Approach: Enter into an agreement with Isell under which we would, with their assistance, apply their process to our manufacturing facilities. Their process has now been in operation for about 18 months in a hardboard plant, using the wet process, located in Casteljalous, France.
3. Current Plans: Two of our technical personnel have visited Casteljalous and witnessed the process in operation. Two of their key personnel have visited our plant. We feel the process has merit and desire to proceed. A signed agreement would be required after which our personnel, together with trained Isell personnel, would order the necessary equipment and start.

R804307 01

The objectives of this study are to evaluate the kind and concentration of chlorine residual that must be maintained in the distribution system to neutralize significantly the pathogenic organisms introduced through system defects. Laboratory experiments will be conducted utilizing bacteria, virus and cyst models in simulated distribution systems. These organisms will be assayed for survival under conditions of varying concentrations of free and combined chlorine. Field evaluations will also be made with long term, large volume sampling of water from distribution system with and without free residual chlorine. Chlorine residual determinations and total and fecal coliform assays will be done. The study will, of necessity, include evaluation of culture techniques and materials.

R804309 01

Principal objectives are to determine the technical and economic feasibility of commodity futures markets for secondary materials. Basic questions to which answers will be sought include: (1) Are secondary materials amenable to commodity futures markets?, (2) Would futures markets increase capital flow to the salvage market industry and improve supply and demand elasticities?, (3) What would be the nature of the benefits to market participants and society?, and (4) What would be the cost to society?

Research will include interviews with officials of commodity futures trading commissions and mercantile exchanges to obtain their views as to impediments and the potential role of futures markets for secondary materials. Existing cash markets for scrap will be studied for price determinants and appropriate grades and product qualities. A statistical determination of the determinants of volume trading based on existing markets is proposed.

R804311 01

New polymeric reverse osmosis membranes will be tested on rinse waters from copper cyanide, zinc cyanide, acid copper and chromic acid plating baths. Membranes will include the NS-100, the NS-200, polybenzimidazole and sulfonated polyphenylene oxide. Life tests of 1000-hr duration will be conducted in which membrane flux and rejection are monitored.

S804312 01

The project objectives are twofold:
- to evaluate non-cellulosic membranes at a pilot scale for treatment of unbleached kraft pulp decker effluents and pine pulp bleachery caustic extraction filtrates, and
- to estimate full scale process capital and operating costs.

The approach includes a 24-month demonstration program utilizing principally the ultrafiltration pilot plant constructed and operated under a previous EPA demonstration grant (No. S 800261), within some modification. Experimental work will be conducted at the Champion International, Canton, N. C. Mill, using "live" effluents at existing pH and temperature conditions. Comprehensive data will be accumulated and evaluated on process and membrane characteristics.

R804314 01

A joint ~~US~~USSR Symposium will be held in Lubbock, Texas on the management of the arthropod, weed and disease pests of cotton, grain sorghum, and deciduous fruit. Thirty-two U.S. and eight Soviet pest management scientists will present papers on the above subjects. The Symposium will be held in Lubbock, Texas, September 28-30, 1975. A proceeding will be published.

R804316 01

The purpose of this investigation will be further assessment of the role of carbon monoxide (CO) as an aggravating factor in the pathophysiology of ischemic heart disease and acute myocardial infarction. Animal studies assessing the effect of graded exposure to low levels of CO on regional myocardial blood flow, tissue oxygenation, and left ventricular function are planned. Further studies on ventricular fibrillation threshold and the genesis of arrhythmias will be performed. Human studies include assessment of CO as a factor limiting exercise performance, aggravating arrhythmias and compromising left ventricular function will be carried out. A long term study of the relationship of carboxyhemoglobin level to myocardial infarction size, morbidity, and mortality from acute myocardial infarction is being undertaken in conjunction with the area emergency medical services and the Office of the State Medical Examiner.

The investigation of matrix interferences in sediments and soils subjected to trace metal pollution from acid mine drainage and from burning of coal for energy purposes is proposed. Current analytical practices to determine elemental composition in complex soils and sediments are subject to large errors due to matrix interferences when atomic absorption is used. The expense of eliminating such interferences by the Method of Standard Additions is prohibitive. Interferences from iron and aluminum affecting atomic absorption analyses of trace metals in marine sediments have been previously observed by Gulf South Research Institute. Environmental samples receiving acid mine drainage and power plant fallout will receive enhanced quantities of interferents. A method for estimating and correcting for these interferents is required that will permit low-cost, accurate environmental impact assessments to be made.

Fifteen soil samples taken in the vicinity of a coal-burning plant and fifty bottom sediments from rivers receiving acid mine drainage will be studied in addition to ten control soils and twenty-five control bottom sediments. The analytical sequence proposed includes sample preparation (acid digestion of homogeneous sample), analysis of seven major constituents, analysis of fifteen common trace constituents in each sample type, and identification of matrix interferences. The interferences will be identified by the Method of Standard Additions, analysis with matrix-matched versus aqueous standards, and analysis using appropriate non-absorbing wavelengths. The matrix correction required for rapid, accurate determinations of trace metals in soils and bottom sediments will be reported. A recommendation will be made on the basis of results obtained in this research program for each trace metal of environmental importance of each sample type.

The main objective is to determine the effects of chlorinated and brominated hydrocarbons on the metabolism of foreign organic compounds. An additional objective is to study their influence on porphyrin synthesis.

Rats will be dosed daily for prolonged periods with several concentrations of a number of benzene derivatives containing varying degrees of chlorination and bromination, and the effect of such treatment on parameters of drug metabolism will be assessed. Recovery will be monitored by imposing a recovery period between the cessation of treatment and the measurement of effects.

The time periods of interest range from 14 to 120 days. The parameters of xenobiotic metabolism include EPN detoxification, benzpyrene hydroxylase, azoreductase, glucuronyltransferase and elements of the microsomal drug metabolizing system. In the porphyrin synthesis studies, total porphyrin and porphyrin precursor content of the liver and urine will be monitored.

R 804 329

Objective - to evaluate the treatment efficiency of technological processes defined by EPA as BATEA for the textile industry and to evaluate the economic achievability and impact on the industry resulting from the application of these technologies.

Approach- the project will consist of two phases, (1) engineering field studies and (2) economic evaluation.

Phase 1 - to be conducted by a mutually agreed upon consultant engaged prior to the development of the testing program. Two mobile pilot treatment units will be designed, constructed and, in total, be operated at approximately 24 manufacturing plant sites over the study period. Each plant site will be selected from BPT class plants to represent as completely as possible, all the EPA textile plant subcategories. The treatment processes to be tested by the mobile pilot plants will include chemical treatment (including carbon adsorption), multi-media filtration, chemical coagulation/clarification (or equivalent) and other mutually acceptable processes if they can be accomplished within the scope, funding and context of the project.

Phase 2 - Process treatment data from phase 1 will be used to evaluate the economic achievability and impact upon each segment of the industry resulting from the application of the technologies tested in phase 1. This phase will be conducted by a mutually acceptable specialist in the field of economics.

Current Plans - the project will be under the general direction of the Environmental Preservation Committee of ATMI with a day-to-day monitoring by the Water Subcommittee. The Effluent Guidelines Division and the Office of Research and Development of EPA will be requested to cooperate in the project and to assign personnel to meet with ATMI representatives in formulating and monitoring the project.

R804333 01

Objective - to increase the sensitivity at which identifiable spectra of components eluting from a gas chromatograph or a high-performance liquid chromatograph can be measured on-line by a Fourier transform spectrometer operating in the dual-beam configuration. To design a trigger so that such spectra are measured with the maximum signal-to-noise ratio and least contamination from neighboring peaks. To design a scanner by which spectra of all components of a mixture separated by TLC can be measured without extracting the samples.

Approach - a dual-beam optical system will be designed which can be used for both GC-IR and LC-IR measurements. In addition a single beam method involving masking out the region of the infrared spectrum between 2700 and 1800 cm^{-1} will be tested for LC-IR. TLC plates will be made up on AgCl substrates and transmission spectra will be taken. A programmed multiple development apparatus will be used to increase the sensitivity of the TLC-IR measurements.

R804337 01

The object of this project is to develop a statistical base for evaluating the necessary frequency of sampling and analysis for data collection designed to assure accuracy in determining short term (1 or 2 years) trends in water quality in streams and lakes. Conversely, the object is to determine the relative errors (average percent deviations) for sampling intervals greater than daily. These objectives are also relevant to meaningful indices.

It is proposed that a program of daily sampling for a minimum of two years be initiated on six streams near USGS gaging stations in Illinois with variations in watershed size and degrees of degradation. It's also proposed that the same be initiated on three lakes in Illinois with variations in depth, size and degradation.

The parameters are temperature, pH, and dissolved oxygen at the sampling site and alkalinity, hardness, chloride, conductivity, turbidity, dissolved and total phosphorus, suspended solids, total organic carbon, iron manganese, sodium, copper and zinc. Separate samples will be collected for ammonia, nitrate and fecal coliforms. The lake samples will be supplemented for each lake with weekly samples at three depths at a selected point in the lake, for nutrients, turbidity, iron manganese, silica, and total organic carbon. Major emphasis will be placed on biological organisms related to degradation.

R804341 01

The study is to evaluate the vegetative filter concept as a feedlot runoff control method for relatively small feedlots in the Corn Belt region. Evaluation will be based on acceptability in terms of preventing water pollution and as an alternative requiring less capital investment and less management than more conventional "zero-discharge" systems. Data will be collected on four vegetative filter systems in Illinois including a University of Illinois dairy facility, one commercial swine facility and two commercial beef facilities. The major portion of the data collection will be a sampling program to determine the ability of vegetative filters to prevent pollutants carried by feedlot runoff from reaching surface and groundwater. Other pertinent aspects of the design, operation, and performance of vegetative filters will also be studied.

R804343

To help support research and writing the first annual report of the Advisory Council.

Research is proposed in areas concerned with the chemistry, metabolism, environmental alteration, and mode of action of insecticides in mammals, plants and insects with emphasis on the fundamental intoxication and detoxication processes which take place. Attention will be given to the following projects:

(1) Studies on the metabolism and mode of action of selectively toxic insecticides in mammals and insects, and the utilization of the results for the design of selectively toxic insecticides. (2) Studies on the metabolism, toxicology and environmental fate of new insecticides nearing final stages of development. (3) Studies on the inhibition of cholinesterase to establish differences in mammalian and insect cholinesterases and determination of the stereochemistry of the inhibition reaction. (4) Structure-activity relationships of insecticides. (5) Mechanistic studies on the oxidative conversion of phosphorothionate to phosphate esters. (6) Evaluation of leptophos and related organophosphorus esters on the development of delayed neurotoxicity in chickens, including examination of esterases for inhibition. (7) Isolation, identification and evaluation of impurities present in technical organophosphorus insecticides. (8) Studies on the cause and consequence of insecticidal action at the neurophysiological level. (9) Development of new insecticides based on neurophysiological studies. (10) Insecticide cyclic nucleotide interactions in insects and mammals. (11) Gas chromatography studies of insecticides on modified supports.

Kinetic and mechanistic studies will be made of several reactions of probable importance in the SO_2 and NO_x removal mechanisms operative in polluted atmospheres. The primary reactions of the alkyl peroxy (RO_2) and hydroperoxy (HO_2) radicals with SO_2 , NO , and NO_2 will be investigated. The effect of the structure of the R-group on the reactivity in a given reaction will be determined using $\text{R} = \text{H}$, CH_3 , C_2H_5 , $\text{iso-C}_3\text{H}_7$, $\text{tert-C}_4\text{H}_9$, and CH_3CO . Kinetic flash spectroscopy, steady state photochemical experiments, and studies in flow systems will be employed to follow the kinetics of the RO_2 reactions. The identification and kinetic characterization of the initial reactive products of these reactions will be attempted using infrared, visible, ultraviolet spectroscopy, mass spectrometry, and more conventional chemical methods.

The mechanistic and kinetic information obtained in the study will be applied directly to the development of a more realistic computer simulation scheme for the prediction of the rates of SO_2 and NO_x removal reactions and the nature of the initial "sulfate" and other unidentified and recognized products of the sunlight-irradiated, NO_x - SO_2 -RH-polluted atmospheres. The simulations will be made not only for typical urban smog mixtures but for the chemical changes which occur during the long range transport in power plant plumes rich in NO_x and SO_2 .

Four complete manure management systems will be compared over three years for economic impact and effect on the environment. Manure from 60 lactating Holsteins in confinement stall barn will be used. Systems compared include: simulated daily spread as produced, stored liquid manure spread every six weeks, semi-dry manure from experimental storage spread once in spring, and the same spread once in fall. Inorganic fertilizer spring applied will serve as control.

One field having a 2-1/2% slope to a stream will be divided into five 3 acre treatment plots by soil berms. Run off thus confined will be measured and sampled through weirs installed at the lower end of each plots. Corn will be grown for silage each year.

Economic impact will be measured by a) initial investment b) annual operating costs including maintenance, labor, and BTUs of energy required to collect, deliver to storage, remove from storage, transport, and spread the manure c) nutrient conservation measured by difference in analysis of manure between collection and spreading d) efficiency of nutrient utilization measured by the yield of corn silage produced.

Effect on the environment will be measured by a) evaluation of odor at each manure application b) analysis of ground and stream water c) measurement and analysis of run off.

S804350 01

The principal objective of this project is to conduct an extensive evaluation of ultrafiltration for wastewater treatment at the San Leandro plant of the Dewey and Almy Chemical Division of W. R. Grace. Treatment of this waste by ultrafiltration is an application of novel technology to a serious wastewater problem, and provides an economically feasible means of meeting effluent standards for hexane extractables and other contaminants.

This test program will be supplemented by feasibility experiments on the treatment of product waters from ultrafiltration by reverse osmosis and carbon adsorption.

The technical and economic feasibilities of full-scale treatment systems will be assessed.

At the San Leandro plant, ultrafiltration tests will be conducted concurrently with waste characterization tests of the in-feed, concentrate and permeate. A sampler will be used to obtain daily composite effluent samples.

Operating parameters to be routinely monitored include processing temperature and pressure, the ultrafiltration unit circulation rate and pressure drop, and the ultrafiltration permeate flow rate. The UF unit will be operated continuously for twelve weeks.

In addition to the above, reverse osmosis and carbon adsorption tests will be conducted on the permeate to assess technical and economic feasibilities for treatment of the UF product water to meet the effluent limitations guidelines for the industry.

R804351 01

The purpose of this study is to obtain information concerning the mode of action, excretion, and metabolism of the cyclodiene insecticides. It is generally presumed that these compounds exert their action by disrupting the nervous system. Therefore, the influence of the cyclodienes and toxaphene on the nervous system will be investigated with primary emphasis on the mammalian system.

Uptake, excretion, and metabolism of ^{36}Cl -toxaphene will be determined alone and in combinations with methyl parathion and chlordimeform. Urine and feces from the rat will be collected and radioassayed to calculate percentage doses excreted. Uptake will be observed in various organs and tissues. Metabolism will be studied by ^{36}Cl determination and gas chromatography. Possible potentiation of these compounds will be investigated in mammals and insects by standard LD_{50} and LT_{50} methods.

Effects of toxaphene on synaptic and axonal transmission will be studied with electrophysiological techniques and various pharmacological agents. Ion fluxes of ^{36}Cl , ^{24}Na , ^{42}K , and ^{45}Ca across nerve membranes will be measured related to toxaphene poisoning.

To further investigate effects on the nervous system, cAMP, cGMP, adenylyl and guanylyl compounds and chromatographic techniques will be employed.

Halogenated aromatic organophosphorus pesticides such as ronnel, dichlofenthion, chlorpyrifos are found in ambient air of South Florida. Their presence in air at low levels might affect the health of the general population. Similar compounds are used in agriculture, house gardens etc. The wide use of these chemicals results in accidental and occupational exposure. Pesticide applicators and formulators are continuously exposed to high levels of these chemicals.

From our experience, human exposure to halogenated organophosphorus pesticides results in delayed excretion of the urinary metabolites, cholinesterase depression for longer periods which requires prolonged medical attention. Exposure to the non-halogenated organophosphorus compounds results in fast excretion of urinary metabolites, fast recovery from ChE depression which requires shorter medical care.

This study would involve determination of p-values and half-lives of the pesticides, ChE activities, levels of intact in fat and blood, and the rate of excretion of metabolites in rats dosed with these pesticides. The same parameters will be studied in humans accidentally or occupationally exposed to these pesticides to establish correlation between human and animal exposure to these toxicants regarding the excretion of metabolites, possible fat storage and delayed neurotoxicity.

Intelligent implementation of water quality regulations, and ecologically sound land-use planning, require a sound scientific knowledge of the ecological responses of natural systems to water-borne substances generated by human activities. This project is specifically addressed to delineation of the functional response of mangrove-estuarine ecosystems to inputs of pesticides, heavy metals, and other chemical "nutrients" in a broad sense.

An initial survey of ecosystem structural properties (L.A.I., herbivory intensity standing crops by functional categories, water quality parameters, faunal population characteristics, etc.) will be related to intensities of human utilization. Ecosystem network models will be used to integrate the data assemblage and to generate testable hypotheses on functional relationships between the ecosystem and pollutional loadings. A second round of intensive studies will test these hypotheses, particularly concentrating on the mangrove ecosystem's organic fuel subsidy to dependent fisheries, levels of primary productivity, and mass balances of particular chemical species. Work to date (under other auspices) has been oriented to development of survey techniques to be used in this project and formulation of a series of preliminary hypotheses to be refined and tested in this project.

Objectives of the proposed work are: (1) to simulate and evaluate automatic control strategies of the activated sludge process; (2) to verify the state-of-art dynamic mathematical model of the activated sludge process; and (3) to improve and advance the state-of-art dynamic mathematical model of the activated sludge process by incorporating the effects of dynamic changes in the biological solids on the clarification and thickening functions of the process. Generally, this will be accomplished by using the state-of-art model to simulate alternative control strategies to provide a basis for the selection of one for subsequent experimental study. The model will then be employed to establish the operational and sampling protocol for the study which will be conducted at the EPA pilot plant in Washington, D.C. Data obtained from the experimental pilot plant studies will be employed to demonstrate the utility of the specific control strategy studied. The data will also serve as the basis for verifying and modifying the state-of-art model of the activated sludge process.

The environmental problems caused by the incorporation of heavy metals (e.g. cadmium, lead and mercury) into our ecosystem have been recognized for several years and have recently received an increasing amount of attention. Presently, very little detailed information is available, on the molecular scale, of the mechanisms of incorporation and action of these metals in biological systems. One of the major problems in ascertaining the role of the metal in biological and toxicological effects has been the lack of sufficient and analytical methods to identify the metal and its molecular form.

Metals of primary importance to this study, because of the ease in which they can enter the environment are: cadmium, tin, mercury, lead, and to a lesser extent selenium and thallium. These metals are ideally suited for a multinuclear magnetic resonance study involving direct observation of the metal nucleus by Fourier techniques because of their respective receptiveness to an nmr experiment and because they are all spin 1/2 nuclei. The primary objectives of the research proposed herein are twofold. Firstly, to characterize in detail the nmr parameters (chemical shifts, lower limits of sensitivity, spin coupling constants, relaxation times (T_1 and T_2) and their respective mechanisms) of the organometallic and coordination compounds of these metals in solution. This research will also entail investigations of these metals interacting with amino acids, hormones and peptide fragments of various sizes. Secondly, based upon the results of the investigations of the nmr parameters, studies will be initiated to follow the interaction of these metals within metalloproteins. This will involve the direct observation of the metal in a metalloprotein; and in selective examples (^{113}Cd and ^{207}Pb), experiments will be designed to observe the metal in the protein while the protein is involved in a catalytic role. Such innovative experiments will yield significant information toward a further understanding of the structure-function role metals play in metalloproteins.

S 804 360

(1) Objectives: To provide professional and technical assistance; to disseminate information on all aspects of solid waste management; to provide timely input to EPA on programs, Regulations, guidelines, and legislation; to facilitate the sharing of information on solid waste management between cities; to provide information to EPA on successful solid waste practices and the degree to which they exist.

(2) Approach: (a) Three group technical assistance working sessions will be held; (b) ICMA will publish three issues of Refuse Report, a newsletter of the latest happenings in solid waste management; (c) four technical assistance transfer team visits will occur responding to cities with specialized needs; (d) a special index on solid waste practices and resources will be developed; (e) ICMA's solid waste clearinghouse will be further developed and expanded.

R804361 01

Objective: The objective of this research is to perform optical Revised measurements on concentrations of asbestiform particles in Lake Superior water for possible application to monitoring of finished water from filtration plants.

Approach: So far as the optical detection of low concentrations of fibers is concerned, one must either produce a sufficient signal for a d.c. type measurement, or be able to analyze the statistical fluctuations in the signal when the signal is very low. The former is an integrating type of measurement, meaning that the properties of many particles are observed at an instant. The fluctuations method yields recognizable signal for detection of very low concentrations of particles and is the prime method to be investigated here. The problem here is to investigate further the origin of the signal pulses and in particular investigate the pulse shapes as they are related to particle size and concentrations.

Work Plan: The research project can be represented in two phases:

I. Further experimental work (a) Studies of signal fluctuation as a function of the particle shape and size. (b) Investigation of magnetic and electric field effects on the asbestiform particles. (c) Polarization effect studies for very low concentrations. II. Construction of apparatus and electronic equipment suitable for comparative testing of the optical method in conjunction with electron microscope work on Duluth filtration plant samples.

The objective of the project is to determine the association between the presence of asbestos fibers in drinking water and the incidence of cancer in the population served by such water supplies. The study will be divided into three overlapping phases: The first phase deals with the identification and description of San Francisco Bay Area water shed and water distribution systems, which will include: the site of water sources, their geomorphic composition, geo-political area served, method of water treatment and means of distribution. The second phase will be directed towards the determination of number, size and type of asbestos fibers present in the various water supplies before and after treatment and after distribution. The third phase will involve a tabulation of tumor incidence and cancer mortality data from the 3rd National Cancer Survey conducted in the five San Francisco Bay Area counties under consideration. Correlations between the observed occurrence of asbestos in drinking water and the incidence of human cancer will be determined using the information gathered in the three phases of this study.

S 804 367

"Demonstration of Ultrafiltration and Carbon Adsorption for Treatment of Industrial Laundering Wastewater. The purpose of the proposed project is to investigate on a pilot scale the effectiveness of ultrafiltration and carbon adsorption for the treatment of laundering wastes. The project will establish the ultrafiltration/carbon adsorption system's economics, efficiency of removal and optimum operating conditions, energy use as well as the system's sensitivity and overall performance.

1. Objectives - To investigate a new concept in instruments for determining quantity of oil suspended in water & to characterize and evaluate the basic phenomena & interactions involved in the proposed system.
2. Approach - Unclad optical fibers, the cylindrical surfaces of which have been made organophilic by chemical treatment, will be suspended in a flowing stream of the fluid to be analyzed. As the contaminant (oil) is selectively adsorbed on the fiber surfaces, the through-transmission attenuation constant of the optical fiber bundle will change as the fringing electromagnetic field at the fiber surface interacts with the adsorbed material. Electronic circuitry will be provided to produce an electrical signal related to contaminant concentration.
3. Current Plans - System components will be designed and fabricated in breadboard form. Processes for applying organophilic coatings to optical fibers will be established. Tests to determine sensitivity, selectivity, temperature and pressure dependence and regenerability will be conducted.

R804369 01

The complex problem of trace organics contaminants in water supplies can be broadly divided into two major categories: 1) naturally occurring organic substances that are transformed to potentially more harmful species by water treatment operation such as chlorination; and, 2) compounds of industrial, agricultural, and other man-related origin that are now indigenous to many raw water supplies and which resist removal by conventional water treatment practice.

Substantial effort is being directed by the U.S.E.P.A. to resolution of problems associated with the first category of compounds; one potential solution is to use activated carbon treatment in advance of chlorination to eliminate the precursor compounds. The proposed research will be directed to removal of the second category of contaminants, to an evaluation of the competitive effects that naturally occurring organics have on the effectiveness of carbon for removal of the second category of contaminants on a long term continuous basis, to the effects that other major water treatment operations have on this effectiveness, and to quantification of the associated adsorption dynamics to facilitate optimum design and application methodology.

R804375 01

The objective of this renewal grant request is to continue monitoring for Naegleria fowleri in various surface waters and mammals and/or avians which may serve as reservoirs in nature.

During the past year, techniques have been tested and refined to: (1) concentrate the organism from large quantities of water, (2) isolate the agent from throat and rectal swabs of animals, and (3) perform fluorescent antibody studies of the isolates. Limited inoculation studies of avians have been carried out to determine which species may serve as a reservoir in nature. These will be expanded to include various mammalian species.

R804376 01

Rapid quantitative determination of beryllium via proton scattering will be investigated as a function of both scattering angle and bombarding energy. Simultaneous observation of other elements using wavelength dispersive X-ray analysis will also be evaluated. Extension of the X-ray technique in order to determine oxidation states by measurement of chemical shifts and differential population of satellite lines will be examined.

R804377

"Removal of Fluorides form Industrial Wastewaters Using Activated Alumina"

This project is a laboratory and a pilot plant development of activated alumina adsorption technology for treatment of fluoride wastewaters from feldspar wet-process beneficiation.

R804381 01

The purpose of the proposed research is the development of an on-line infrared spectral search system utilizing pattern recognition and information theory. This application proposes:

- a) The collection of a high quality infrared spectral library;
- b) Pattern recognition and information theory investigations of optimum infrared spectral features; and,
- c) Development of an on-line, rapid search system for infrared spectra.

R804385 01

Public Technology, Inc., in cooperation with the American Water Works Association Research Foundation and the National Water Well Association, will conduct a Fact Finding, State-of-the-Art, survey of municipal water treatment practices involving ozonation overseas, in Canada, and in those few installations that are operating in the United States.

The objectives are to document specific data on the known application of ozone for drinking water treatment, including data on engineering design, effectiveness, health and safety aspects, effects on materials of construction, reduction and/or elimination of sludge disposal problems by use of ozonation in place of chemical treatments, and costs of ozonation. Specific emphasis will be placed on documenting what is currently known and practiced on the use of ozone for removing dissolved organic materials prior to the disinfection step, and on identification of oxidation products formed by treatment with ozone.

The project will be one year in duration and will consist of identifying existing facilities worldwide currently employing ozonation as part of their water treatment process. Information will be gathered by questionnaire and by site visits to selected facilities in Europe and Canada.

R804389 01

The purpose of this study is to document county governments' policy and activities in solid waste disposal and management. Further, an attempt will be made to discover the impediments, i.e., legal, programmatic, technological, fiscal, to more efficient and cost-effective service delivery at the county level. This will be the first data base of such emphasis and will be published by the Association. In addition, the Association will provide intermediate technical assistance to county government through a variety of mechanisms.

R804393

To demonstrate a device for high efficiency collection of submicron-sized particulate matter from power plant and industrial plant effluent streams by use of charged drop et scrubbing.

R804394 01 0

The objectives of this study are to determine the nature and concentrations of the halogenated organics already present in the water supply and how these are influenced by chlorination, and to evaluate the relative importance of the various sources of both halogenated and halogenateable organics.

The river selected is the Passaic river in Northern New Jersey which is a water supply source but receives significant pollutants. A number of sampling stations will be established on the river and its major tributaries and correlated with the water intake and treatment quality. These water samples will be examined for their halogenated organic contents before and after chlorination. In addition, stormwater, combined sewage overflows, rainwater and municipal and industrial treatment plant discharges will be similarly examined. Separation techniques will involve extraction volatilization or adsorption. Identification will be made through GC-Mass Spectrographic analysis, and quantitation through GC analysis using an electrolytic conductant detector.

Recent estimates suggest that as much as three-quarters of the U.S. cancer incidence may be caused by environmental agents, particularly synthetic organic compounds. A necessary prerequisite to reducing environmentally-caused cancer is a methodology capable of detecting and identifying carcinogens in environmental samples. The purpose of the proposed work is to further develop a new and highly promising method for the rapid detection and identification of synthetic organic compounds in mixed environmental samples--a testing system based on bacterial mutagenesis. The proposed project would conduct the research necessary to improve and expand the applicability of this testing system. The proposed work seeks to accomplish the following specific objectives:

1. Improve the statistical reliability of the Salmonella test by conducting experiments aimed at reducing the occurrence of "false negatives"-- i.e. failure of substances which are carcinogenic toward laboratory animals to give a mutagenic response different from a noncarcinogen;
2. Analyze the mechanisms involved in the microsomal activation system used in the Salmonella test in order to develop activation systems which improve the sensitivity and reliability of the Salmonella test system;
3. Develop techniques for detecting mutagenic metabolites in the urine of animals exposed to carcinogens;
4. Apply the analytical capabilities developed to the testing of environmental samples and the urine of people exposed to carcinogens.

S604400

Public Technology, Incorporated proposes to investigate, through the mechanism of a user requirements committee, the applicability of EPA developed hazardous spills control devices to emergency situations as encountered by fire departments.

We will field test and demonstrate with the cooperation of developmental contractors and selected fire departments to document the performance and utility of the devices in emergency situations. The information developed will be widely disseminated to the user community.

The total project will require three years to perform. A committee will be selected which represents all segments of users impacted by the introduction of such devices. The will evaluate current hardware and select those suitable for field tests and demonstrations. A six month field test of these devices will be performed by selected fire departments. The devices will be used as on-line hazardous spills equipment. Following the field tests, a series of regional demonstrations will be held to acquaint the fire community at large with the field test results and utility of the devices.

R804401 01 0

1. To define and assess, qualitatively and quantitatively, the scope and magnitude of the military munitions demilitarization requirements.
2. To describe and demilitarization processes now in use, and those under development.
3. To define and characterize the typical solid, air and waste water effluents from the demilitarization processes.
4. To identify the disposal and treatment processes for the solid, air and waste water effluents of demilitarization, including both those now in use and those under investigation in military research and development programs.
5. To evaluate and arrive at conclusions on the effectiveness of various alternative solid, air and waste water effluent treatment and abatement methods for specific munitions and for specific demilitarization processes.
6. To define and recommend R,D&D programs for joint EPA-Military support, in order to enhance and facilitate the development of promising technology for economical demilitarization of munitions in a manner so as to minimize adverse environmental impact.
7. To provide a basis for transfer of useful technical information among EPA and the Military Services.

R804402 01

The primary objectives of this project are (1) to carry out laboratory studies on the specific nutritional requirements and characteristics of Cladophora sp. and several other Great Lakes algae and (2) to utilize the results in explaining the occurrence of nuisance Cladophora growths in the Great Lakes and in developing measures to control these growths. The qualitative and quantitative nutritional requirements of Cladophora glomerata were emphasized in an earlier phase of this program. Studies in this project will concentrate on evaluations by several techniques of the aggressiveness and competitiveness of Cladophora glomerata in the uptake of phosphorus and other key nutrients at concentrations approximating those in the Great Lakes. To evaluate the results with Cladophora glomerata, data will be obtained from comparable studies with other aquatic plants, particularly organisms with which Cladophora competes under natural conditions. For these studies, diatom species which are abundant in Lake Michigan will be isolated and their detailed nutritional requirements will be established. Studies also will be carried out to determine the critical nutrients which control and limit the development of nuisance Cladophora sp. growths in Lake Michigan. Plant analysis bioassays and lake water nutrient enrichment assays will be made on the requirements of Cladophora glomerata for inorganic and organic trace nutrients and on the unusually high sulfur and boron requirements of the alga.

R804403 01

The investigation is concerned with the nature, distribution, and origin of the inorganic constituents of coal. This "mineral matter" in coal is, at times, deleterious and may, among other influences, contribute significantly to problems of air and water pollution. In order to obtain a relatively unaltered mineral matter residue as a starting material for our investigations, the technique of electronic low-temperature ashing is routinely used. After ashing the coal at temperatures below 150° C, the mineral matter residues are investigated by X-ray diffraction, and optical and electron microscopy for mineralogical analyses; by X-ray fluorescence spectroscopy, atomic absorption spectroscopy, optical emission spectroscopy, electron microprobe analyses, neutron activation analyses, and general "wet chemical" methods for elemental analyses; and by sieve analyses and Coulter Counter analyses for size determination.

The major areas of interest in which investigations are continuing are: 1) The mode of occurrence, distribution of trace elements and minerals in coal, 2) the mineralogy and genesis of iron and zinc sulfide minerals in coal seams, 3) mineral and elemental distribution within coals of the Illinois Basin, and 4) the potential for removal of minerals and their constituent chemical elements by coal washing techniques. Data from all of the above investigations are then related to the origin and geochemical history of the coal seams.

R 804 404

Concerning (1) Objective and (2) Approach - See attached Pages L-3

Concerning (3) Current Plans and/or Progress - The project is scheduled to commence in early 1976 subject to the approval of EPA.

R804407

This proposal consists of two separate but completely interrelated substudies: (1) macroecosystem study and (2) microecosystem study.

R804411 01

The AOAC proposes to publish and distribute the "Manual of Chemical Methods for Pesticides and Devices," a loose-leaf compendium of analytical procedures and data compiled by EPA and State laboratories. The AOAC will provide technical assistance and review and will also aid in the validation of the methods in the Manual. The Manual will be kept current by semi-annual updates. EPA will retain complete control of the content and format of the Manual.

The broad objective of this program is to maximize the value of pyrolytic oils obtained by pyrolysis of agricultural, municipal, forestry and other wastes so that maximum resource recovery and economical utilization can be realized from these materials. In order to accomplish this objective, an extensive research and development program is proposed which will develop a data base for evaluation of the oils for uses other than as a fuel. Pyrolytic oils have potential as a source of chemicals, as a chemical feedstock, and for specialty uses for specific fractions obtained from the oils. The overall investigative program is divided into three phases which represent distinct areas for research and development but at the same time are interrelated.

Phase I, during the first year, would involve primarily physical processing of the oils and characterization of products and fractions obtained by the processing methods. Physical processing would involve various methods of distillation, such as simple distillation at atmospheric and reduced pressure, use of fractionation columns, steam distillation, flash distillation and molecular distillation. Pretreatment of the oil prior to processing will be investigated as a means of improving its processing properties.

Phase II, during the second year, would involve chemical processing of the oil and/or fractions from physical processing. Chemical processing would include, but not be limited to, hydrogenation, alkylation and cracking. Products from different chemical processing techniques would be characterized as to their chemical and physical nature.

Phase III, during the third year, would be determined in large measure by the results of Phases I and II. An evaluation of the results of Phases I and II would be made to select the most promising processing and treatment methods for upgrading pyrolytic oils. These processing methods would then be investigated at the pilot plant level.

This study will (a) investigate the influence of particulates in water on the viral disinfection process using chlorine dioxide as the disinfectant and bentonite and alum as the particulates; (b) evaluate the disinfection capabilities of chlorine dioxide using enteroviruses as the test viruses, along with reference bacteria and bacteriophages for comparative purposes at different levels of chlorine dioxide, temperatures, contact times, pH values, and concentrations of particulate matter; (c) determine the effect of viral aggregation on survival of the test microbes during the disinfection process through characterization of the virus inoculum by electron microscopic assay of the viral units; and (d) evaluate the effect of the disinfectant on enterovirus-associated animal cells which simulate naturally-found cell-associated viruses excreted from the intestinal tract of man. In addition, other disinfectants such as hypochlorous acid, hypochlorite ion, and the chloramines will be used to compare their relative viral disinfection efficiencies to that of chlorine dioxide either singly, together, or in sequential addition to determine the effect of combinations of chlorine and chlorine dioxide on the viral disinfection process. The use of chlorine dioxide as a disinfectant in water supplies assumes greater importance when consideration is given to its reduced reactivity with precursor organics in water to form chlorinated organic compounds which may be later identified as carcinogenic. As chlorine dioxide becomes a more used disinfectant because of its lessened capability to form chlorinated organics, more information is required concerning its disinfecting capability and factors that influence such ability.

R804419 01

The finding of measurable amounts of various aliphatic halogenated hydrocarbons in the drinking water of municipalities throughout the United States prompts a better understanding of the levels of contaminants which might produce toxicity and the scope of toxicological reactions. This project will investigate genetic differences and hormonal differences in susceptibility to hydrocarbon toxicity. Studies will be conducted on the acute and subchronic effects of simple hydrocarbons including chloroform, bromoform, chlorodibromomethane and dichlorobromomethane. Experiments will include determination of median lethal dose, median target-organ dose and target-organ regeneration studies in males and females of a given inbred mouse strain and in animals of different inbred mouse strains. The role of steroid hormones in modulating toxicity will be investigated. The possible mutagenic effects of these compounds will be evaluated by the in vivo, bone marrow micronucleus test. Long-term effects will be established with graded dose subchronic studies of 3 months duration.

R804420 01

This research will apply the most sensitive of assays to various carbonfiltered waters, viz., an evaluation of pyrogenic response in test animals coupled with the new Limulus lysate quantification for gram-negative endotoxins. Any responses or measured factors will be related to bacteriological methods used in standard practice. The work will commence with highly treated wastewaters and progress to potable waters, with the effects of various disinfection practices being evaluated thus providing some estimates of safety factors.

R804422 01

To determine the most feasible method of removal of naturally occurring mixed Amphibole and Chrysotile asbestos form fibres from a major source of City of Seattle water supply.

To extend the methodology developed in Duluth Study to include Chrysotile removal by modifications of the filtering technique successfully developed for removal of Amphibole fibres.

To acquire physical/professional capability to conduct Pilot Plant Studies using a small package plant at the source. This will require the addition to professional staff to coordinate existing Department manpower capabilities and capital investment for equipment.

Since discovery of asbestos in Tolt source during a joint city/state/ EPA survey, studies have continued both jointly and independently by the City. Seattle is currently engaged in a watershed sampling and analysis program to define areas of natural contribution and to determine if asbestos concentration is subject to seasonal influences.

R804424 01

This research project will develop quantitative models for first to third order woodland streams subject to natural perturbations as integral elements of ecosystem management. Specifically, additional dynamic models of stream processes will be synthesized at several levels of resolution based on a planned series of experimental investigations in natural streams and controlled channels. Parameterization and system model verification experiments are also planned. Techniques will be developed to permit reasonable estimates of system states from directly measurable stream variables.

R804427 01

The principal objectives are: to determine the concentration of selected environmental carcinogens in economically-important molluscs and crustaceans from Oregon bays, estuaries and inshore areas; to determine if there is a potential public health hazard from consuming shellfish which contain carcinogenic petroleum by-products; to survey populations of bivalve molluscs, determine the incidence of neoplastic diseases in these populations and ascertain if there is any correlation between carcinogenic body burdens and incidences of such diseases; to determine if metabolic pathways exist in bivalves which lead to detoxification or modification of benzo(a)pyrene; to determine the acute and chronic effects of exposing molluscan and crustacean gametes and larvae to selected chemical carcinogens, and evaluate the ecological consequences of such effects.

Seven economically-important shellfish will be sampled monthly during a two or three year period and the following studies will be conducted: quantitative and qualitative determinations of chemical carcinogens present in shellfish; histopathological examination of bivalves for neoplastic diseases; studies related to benzo(a)pyrene metabolism and rates of uptake, incorporation and elimination in natural populations of shellfish. Following completion of this research, personnel from appropriate state and federal agencies will evaluate the public health implications of our findings.

R804428

"An Evaluation of the Anaerobicfilter as a Device for Treating Pharmaceutical Wastes" - The proposed work envisions determining the effectiveness of anaerobicfiltration for pharmaceutical wastes. Pilot scale studies will allow the development of design equations for scale up and provide a broader data bank for the applications of anaerobic systems. The usual concentrated waste associated with this industry will not hinder the method's operation production of methane and elimination of aeration costs will provide additional economic incentives.

R804429 01

The effects of atmospheric aerosols on weather and health are related to aerosol size distribution, concentration, and composition. One of the most significant size-related classifications of aerosols is the aerodynamic size distribution. At the present time, there is no one instrument that can be used readily for real-time analysis of aerodynamic size spectra over the range of 0.1 to 10.0 μm in diameter, which probably includes the most significant size spectrum of respirable particles. The primary objectives of this proposal are: (1) to design and build a prototype real-time aerosol size spectrum analyzer for in situ particle sizing over the range of 0.2 to 5.0 μm in equivalent aerodynamic diameter through relaxation-time measurement with laser Doppler velocimetry and (2) after basic research into the methods of real-time measurement, to develop an aerosol size spectrum analyzer over the range of 0.05 to 25.0 μm in diameter.

R804430 01

The objectives of this research project are to a) establish the relative contribution to total trihalomethane production of natural aqueous humic material in waters from different sources, b) characterize the chemical nature of the reactions that occur between aqueous humic materials and chlorine, and c) assess the water treatment implications of prechlorination of humic-containing waters with respect to the formation of trihalomethanes and other chlorinated organic species. The experimental approach includes laboratory chlorination studies and GC/MS identification of reaction products with different natural humic waters and various model humic structures. A wide range of model organic compounds representative of natural humic material will be chlorinated over a range of pH, chlorine to carbon ratios, and temperatures representative of conditions in water treatment plant operations. Trihalomethanes and total organic chlorine concentrations will be measured. Humic fractions extracted from raw water supplies will also be chlorinated, in the presence and absence of surfaces and treated in the same manner as the model compounds.

R804431 01

The Santa Clara Valley Water District is planning to construct and operate a 2 mgd advanced wastewater treatment plant in Palo Alto, California, and will inject the reclaimed water into a local groundwater aquifer. The objective of this research is to determine the feasibility of such a system for reclaiming water for potable uses. This study will evaluate the effects the injected wastewater will have on the chemical, physical, and biological quality of the basin and injected waters, will determine the effect injected wastewater will have on the hydrologic and mineralogic characteristics of the aquifer, will seek the optimum quality for injected water which will result in a high quality basin water and minimum damage to the hydrologic characteristics of the aquifer, and will evaluate the quality of reclaimed water for potable uses. The first phases of the study are to develop methodology and to obtain necessary background information for evaluating the system performance and reliability.

S804432 01

The objectives of this study are to compare the effectiveness of various street cleaning programs in non-point pollution abatement. Other areas of investigation will concern the treatability of street surface particulates in stormwater treatment systems, investigations of the mass balance relationships of street surface containments through various sections of the stormwater drainage system, comparisons of various testing procedures to determine the most reliable method of analyzing BOD in urban runoff (and other wastes having high organic and toxic material contents), and determining airborne fugitive particulate emissions from paved roadways.

The project will rely heavily on field and laboratory testing procedures to be conducted in the selected demonstration city of San Jose, California. Various street cleaning programs (different generic equipment types with various cleaning schedules) will be compared on the basis of resultant street-surface residual particulate data (loadings, particle size distributions, selected pollutant strengths, etc). These testing procedures will include real environmental conditions that effect street cleaning operations, such as parked cars, different weather conditions, variable particulate loading, etc., that cannot be easily tested in controlled strip tests. The other elements of the project will involve various in-situ field and controlled laboratory testing.

R804433 01

The objectives of this study are to: Identify organic compounds occurring in community water supplies and water distributed to the customer. Investigate treatment methods and treatment agents capable of eliminating or significantly reducing the concentration of toxic or potentially toxic organic contaminants found in community water supplies. Demonstrate the feasibility of such treatment on a large enough scale that the observed performance will reliably indicate how a full scale system will perform.

Ten water utilities will be selected to participate actively in a survey of trace organic compounds present in their water. A monthly sampling program will be carried on during a one year period. One of the ten water utilities will be selected for a pilot plant project in which a side-by-side comparison of treatment using granular activated carbon, powdered activated carbon and polymeric adsorbents will be made. A bench scale comparison of activated carbon and polymeric adsorbents will precede the pilot plant project. The bench scale tests will aid in the selection of adsorbents and in working out operating procedures to be used in the pilot plant tests.

R804435 01

We will determine the capacity of marine organisms to metabolize environmental pollutants including pesticides and carcinogenic polycyclic hydrocarbons. Microsomal mixed function oxidases (MFO) have not previously been studied in marine invertebrates; we will study them in the oyster (Crassostrea virginica) and the lobster (Homarus americana). We will study the general properties of the enzymes benzo(a)pyrene hydroxylase, DDT hydroxylase, aldrin epoxidase, and heptachlor epoxidase. The metabolites of ^3H benzo(a)pyrene are quantified by assaying the radioactivity of NaOH and aqueous extracts of reaction mixtures containing the parent compound, microsomes, and NADPH-enriched medium. The production of pesticide metabolites is measured by gas chromatography using an electron capture detector. The inhibition of MFO by pharmacological inhibitors (SKF 525-A, Lilly 18947 and iproniazid) and pesticide synergists (sesamex and piperonyl butoxide) will be assayed.

We also plan to study induction of MFO by pesticides, phenobarbital, and Arochlor (PCB). If invertebrate MFO are highly inducible, like mammalian MFO, the level of their activity may reflect the level of pollutants in the test organisms environment.

MFO are required to convert carcinogens to their biologically active forms. Since all the compounds being tested are oncogenic in mammals, the ability of invertebrates to metabolize and/or activate them may provide the basis for developing a model for invertebrate carcinogenesis.

Benzo(a)pyrene is an energy-related compound of known carcinogenic potential. We will assay its accumulation in the oyster, which is known to concentrate other polycyclic hydrocarbons. The necessity to study the bioconcentration of this mammalian carcinogen by animals found in the human diet is obvious.

R804438 01

The objectives of this work are (1) to determine the feasibility of adsorbing colloid flotation methods for the removal of nickel, manganese, cobalt, chromium(III), antimony, and thallium from wastewaters, and (2) to carry out small-scale pilot studies using these methods to remove lead, copper, cadmium and fluoride from wastewaters. A mathematical model of foam flotation stripping column operation will be tested.

R804440 01

Our objectives are to develop a method for determining the chemical composition of the pyrolytic oils immediately after collection and then to observe any changes in the chemical composition of the oils as a function of increasing viscosity. Also, after the mechanism of the increase in viscosity of the pyrolytic oils has been elucidated, attempts will be made to stabilize the pyrolytic oil against whatever changes it undergoes. We plan to develop, jointly, a combined gas chromatographic-mass spectrometric and liquid chromatographic analysis scheme for the pyrolytic oils. After identifying the process or processes responsible for the viscosity increases, appropriate antioxidants and/or antipolymerization stabilizer systems will be used to stabilize the pyrolytic oils.

R804442 01

Saginaw Bay is a shallow 3,000 km² extension of western Lake Huron, enriched at its southwestern end by urban and agricultural drainage from the Saginaw River. Objectives of the three year survey are to: (1) continue monitoring of major nutrients in Saginaw Bay (begun in 1973) to support further development and verification of EPA models of nutrient transport and productivity; (2) initiate a comprehensive study of the distribution and fate of hazardous substances in the water, sediments and biota of Saginaw Bay. Nutrients, as well as physical, chemical and optical parameters, will be measured in situ, aboard ship and in the laboratory. The role of primary decomposers in nutrient recycling will be investigated. Sixteen stations throughout the bay will be sampled at 18-day intervals coinciding with LANDSAT (ERTS) passes. Hazardous substances to include metals (cadmium, lead, selenium, chromium and zinc) and organohalogens (DDT, PCB) will be sampled at stations and among the dominant biota of inshore marshy areas. Other collaborative studies of plankton, remote sensing of water quality and watershed land cover mapping are planned.

R804444 01

The objectives of the research project are to:

1. Determine the extent and nature of water quality problems originating in water distribution systems in the U.S.
2. Conduct laboratory studies to assess the potential for a treated water to promote sediment deposition and microbial growth in distribution systems.
3. Determine the role of microorganisms in mediating chemical changes observed in distribution systems.
4. Determine remedial measures for controlling sediment deposition, organism growth and quality deterioration.
5. Prepare a guidelines document for use by water utilities for assessing and controlling water quality problems in distribution systems.

A nation-wide mail survey, followed by selected site visits will be made to determine the extent and nature of water quality problems in distribution systems. Laboratory studies will be conducted using pipe loops to determine the water quality changes under varied conditions of input water quality. Alternate methods to control the water quality deterioration in laboratory pipe loops will also be tested.

R804450 01

The research will develop a planning tool for water quality analysis in non-designated 208 planning regions. The tool will include a model for preliminary screening to isolate problem areas of point and non-point wastes and evaluate information for follow-up detailed modeling to assess the impact of waste management alternatives. The planning model will function with a limited data base, and will provide high and low estimates for simulation results. The output will be designed for ease of interpretation by the planner. The non-point source data base and the loading functions developed by Midwest Research Institute will be used to estimate pollutant flux from watersheds.

Rivers, estuaries, and impoundments will be accommodated as well as storm water runoff. Several approaches to water quality modeling and analysis are included to offset the potential bias of any single method.

The product will be useful to provide prescreening for a large area and to focus on regions not conforming to the goals of PL 92-500, especially because it will be easily applied with a limited data base. Substantial saving in planning cost is expected without sacrificing accuracy in isolating problem areas.

R804455 01 0

The study will examine the removal of a series of organic compounds using a modified aqueous scrubbing technique. The pilot investigation will study the effects of changing physical constants to cause an increase in solubility and hence removal of organic compounds.

R804456 01

The objectives of this project will be to formulate specific recommendations on the significance and control of *Klebsiella pneumoniae* and other coliforms which are present in drinking water emanating from redwood tanks. The primary objectives will be achieved by the following approaches:

1. Determining the virulence and antibiotic resistance of coliforms present in these drinking water systems.
2. Studies on experimental 1,000 gallon tanks to determine the necessary engineering, plumbing, and chlorination requirements to keep redwood tanks free of coliforms and other undesirable microbes.
3. Determining the nutritional bases for the growth and survival of coliforms in redwood tanks.

R804458 01

This research will examine a mechanism of cycling for various xenobiotics in and through estuarine and marine sediments. A lugworm, *Arenicola cristata* (Polychaeta: Arenicolidae), will be studied to define and quantify movement of compounds through the sediment as a result of reworking and biological accumulation. Experiments are designed to determine, (a) how lugworms move xenobiotics into and through the substrate when the compounds are introduced into the overlying water column; (b) how effectively lugworms move sorbed xenobiotics from various depths in the sediment to the surface and (c) what volume of sediment could be exposed to xenobiotics due to reworking by lugworms.

R804460 01

The objective of this project is to study the physical and biological parameters involved in disinfecting treated wastewater by ozone. The physical parameters investigated will include: (1) determination of power consumption per unit weight of ozone produced; (2) determination of oxygen consumption per unit weight of ozone produced; (3) evaluation of the off-gases recycle system; (4) determination of optimum ozone dosage versus desired disinfection levels; (5) evaluation of the efficiency of contacting system; (6) evaluation of the effect of variability in flow and characteristics of wastewater on ozone dosage; and (7) evaluation of the device for decomposition of the ozone gas in off-gases.

The biological parameter investigated will include evaluation of the efficiency of ozone as a disinfectant.

Results of this study will help establish three things: (1) the cost effectiveness of ozone as a disinfectant for wastewater effluents compared to chlorine which is used commonly for this purpose; (2) the effectiveness of ozone as a disinfectant; and (3) harmful effects, if any, of ozonated effluent on receiving waters.

R804463

"PRESSURE FILTRATION-PYROLYSIS OF SEWAGE SLUDGE IN A MULTIPLE HEARTH FURNACE"- The objective of this project is to develop a workable design for conversion of a plant scale multiple hearth sludge incineration system to pyrolytic or limited air made of operation. The sludge will be dewatered on a filter press and pyrolyzed in a pilot plant 36 inch I.D. multiple hearth unit. Fuel efficiency, emissions potential and cost will be evaluated.

R 804 470

(1) Objectives: Measurement of partial and total vapor pressures of binary and higher-order mixture systems that are known to, or strongly suspected of, forming aerosol particles under atmospheric conditions. Measurements to be performed as functions of mixture composition in the temperature range - 70 C to 20 C and pressure range 10 Torr to 10 Torr.

(2) Approach: Mixture samples are introduced into a high-vacuum system. Total pressures are measured by ionization gauge and capacitance manometry techniques. Partial pressures are determined in the vapor by time-of-flight mass spectrometry.

(3) Current Plans/Progress: An experimental apparatus has been designed and is in the final stages of construction. With completion of the apparatus, preliminary measurements will begin on simple one-component systems and inorganic binary mixture systems (e.g., H₂O-H₂SO₄). A program of study is planned in which measurements will be performed on progressively more complex inorganic systems, to be followed by measurements on organic mixtures which may be expected to exist due to photochemical reaction products of automobile exhausts, industrial emissions, etc.

R804472 01

The recent evidence indicating that chlorination leads to the production of chlorinated organics such as chloroform has stimulated an interest in the use of ozonation as a disinfectant. Very little work has been done regarding the effect of ozonation on organics present in wastewater. The purpose of this work is to examine the influent and effluent from an ozonation unit in a sewage treatment plant in Estes Park, Colorado in order to more understand: 1. Which biorefractory organics are susceptible to ozone? 2. What are the end products? 3. What are the important parameters? Samples of influent and effluent from the Estes Park plant will be collected, concentrated, and analyzed for the organic constituents. The levels of these organics will be correlated with parameters such as O₃ concentration, contact time, and TOC. The analytical methods to be used will include gas and liquid chromatography and GC - MS. Some toxicity studies will be performed as a part of an ongoing project employing various cells as a cytotoxicity test.

R804477 01

Studies of the interaction of surface slick microorganisms and pollutant molecules including pesticides, polynuclear aromatic hydrocarbons, and chlorinated biphenyls will be initiated. The effects of these substances on metabolism of lipids, hydrocarbons, and protein will be examined. The rate of accumulation of recalcitrant molecules in surface films and microbial biomass will be determined in simulated surface slick systems.

The mutagenic effect of selected compounds on surface slick microorganisms and in microbial test systems will be considered.

R804495 01 0

The objective is to plan, execute, and complete a conference on "Land As a Waste Management Alternative." The Conference will permit engineers and scientists to better understand and utilize the capacity of the soil to assimilate wastes. The Conference will draw upon the knowledge and expertise from individuals in disciplines such as sanitary and environmental engineering, agronomy and soil science, agricultural engineering, and economics and from experts in other countries. The audience will consist of individuals in governmental agencies and consulting organizations who have immediate responsibility for waste management, as well as researchers active in this area.

R804497 01

The objective of this research is to prepare a report outlining and evaluating environmental problems relating to the production of animals on pasture or range. The primary environmental concerns to be investigated include: (1) runoff water quality, (2) impact of direct contact between animals and water, (3) accelerated erosion, and (4) impact on vegetation. The report will include all areas of the United States (50 states) and will address major geographical/climatic areas for all animal species and production/management categories. It will contain recommendations for reduction of or control of any pollution problem cited and will be written for use by farm planners, extension personnel, 208 planners, and directors of research in the subject area.

The report will be developed from existing literature, collaboration with range management specialists, and contact with ongoing research projects relating to the subject; it will not involve any new field studies.

R804501 01

The first objective of the project is to determine the growth rate of Catostomus commersoni under different temperature regimes and to construct response curves that can be related to food consumption. Subordinate objectives are (1) to determine the influence of size on growth response at different temperatures and (2) to determine the relationship of optimum temperature to incipient lethal temperatures. A second objective is to determine the influence of reduced rations as compared to ad libitum rations on the optimum temperature for growth in three size groups of fish. Data will be gathered and analysed in a form which will provide input to ecosystem modeling.

R804503 01

The purpose of this investigation is the characterization of northern Lake Michigan in terms of physical, chemical, and biological environments and to provide data for comparison with future studies of the degree and rate of environmental change. Some of the objectives are:

1. To determine the vertical, horizontal and seasonal variations in selected nutrients and other chemical and physical parameters.
2. To determine the effects of islands and their associated morphometry on environmental conditions and to contrast environmental conditions near islands with nearshore areas of the mainland.
3. To analyze phytoplankton, rotifer, and crustacean zooplankton species composition and abundance in northern Lake Michigan.
4. To utilize data on phytoplankton and zooplankton community structure as an indicator of the trophic status of waters in northern Lake Michigan.
5. To provide phytoplankton and zooplankton data that will be useful in conjunction with other parts of the study to assess biological responses to nutrient conditions in northern Lake Michigan waters.

R804507 01

It is proposed to develop an analysis technique capable of analyzing mean tracer concentrations and estimating the covariances between the concentration and wind perturbations. This will be accomplished by defining turbulent flux velocities which simulate the diffusion process and are incorporated in a variational formalism. They are utilized because flux velocities may be determined uniquely at every boundary. There are three surface boundary conditions for which flux velocities may be obtained; total reflection, partial reflection, and total absorption. Due to the nature of the formalism, initial conditions for the dependent variables also must be determined. The mean tracer concentrations and turbulent flux velocities may be computed as a function of space and time using a marching process.

The analysis technique will be developed using generated data to simulate diffusing puffs of tracer material. Several related variational formalisms may be utilized to compute concentrations and flux velocities, from which the most suitable will be chosen. The data assimilation must be optimized in order to obtain concentrations as close to those observed as possible. The developed formalism will be tested using data collected by the Battelle Memorial Institute.

R804510 01

As a result of the favorable profit situation in crop production, many farmers have placed soil bank, marginal and submarginal land into row crop production. The objective of this project is to evaluate the environmental and economical impact of placing three lands in crop production in Georgia. Potential and actual land use changes by soil association and land classification will be estimated using secondary data and remote sensing photos. Representative levels of pesticide and fertilizer uses will be estimated in order to determine environmental loadings of soils, pesticides, and plant nutrients associated with various land uses and crop yields for major land classifications and soil associations. Information developed on changes in land use patterns and environmental loadings will be used to identify actual and potential geographic dispersions of pesticide and fertilizer concentrations resulting from the additional acreage in crop production. The net economic impact of the changes in land use will be assessed with particular attention to estimating the incremental value of agricultural production, net farm income and the secondary impact on national income.

R804512 01

Objectives - Existing data from selected studies of cardiopulmonary conditions (e.g., panel studies of air pollution effects) will be analyzed by methods acknowledging the existence of biological as well as environmental periodicities. Recommendations will be developed for the design and analysis of future epidemiologic studies so that predictable biologic variability (rhythms and trends) can be separated from effects of environmental factors.

Approach and Plans - Statistical methods (including the least-squares fitting of cosine models) will be used to quantitatively define characteristics of resolvable rhythms, preferably circadian, about-weekly (circaseptan), circannual rhythms as well as rhythms with other periods in circulatory and respiratory function of healthy subjects living in relatively pollution-free environments. Extensive time series (e.g., measurements of heart rate, blood pressure and peak expiratory flow 5 or more times daily for several years) are already available for this purpose. Morbidity data (e.g., from appropriate panel studies sponsored by the Environmental Protection Agency) will be analyzed against this background, using rhythmometric and other statistical procedures (e.g., cross spectral analysis). On the basis of this experience, a flow chart will be developed integrating old and now computer programs and providing indications for the design and analysis of epidemiologic time series in general. Primary emphasis will be placed on chronoepidemiologic studies permitting the inferential statistical isolation of rhythms. Such chronoepidemiologic criteria should be particularly pertinent and sensitive for air pollution monitoring with a view of health and disease.

R804513 01

Objectives - 1) To determine whether concurrent exposure to mixtures of hydrogen fluoride and ozone or hydrogen fluoride and nitrogen dioxide produces interactive effects (antagonism or synergism) on the growth, yield or accumulation of fluoride by vegetation; 2) to provide quantitative estimates of the effects of ambient oxidants on the growth, development and yield of economically-important plants; 3) to provide quantitative estimates of the effects of ambient rainfall and simulated acidic rain on the growth, development and yield of crop plants.

Approaches - Field exposure chambers, greenhouses and controlled environment chambers specially designed for these studies will be used to expose vegetation to controlled concentrations of pollutants. Dose-response relationships will be determined to provide a basis for the development of predictive models.

Progress - We have found that (1) yields of beans and tomatoes are reduced by ambient oxidants occurring in Yonkers, New York; (2) sulfur dioxide may lower or have no effect on the accumulation of fluoride in plants exposed simultaneously to hydrogen fluoride and sulfur dioxide depending on the plant species and pollutant concentrations; and (3) repeated exposure to simulated acidic rain causes necrotic lesions on susceptible herbaceous plant species when pH values are less than 3.4 and on needles of Eastern white pine trees when pH values are less than 2.6.

R804514

To quantitatively describe the faunal composition, density, standing crop, diversity, dominance, and spatial homogeneity of the subtidal macrobenthos of Bahia Felipe, the site of the METULA spill, and immediate neighboring areas.

To correlate changes in community structure with depth, bottom water quality, and sediment characteristics, especially oil contamination, particle size distribution and organic carbon content.

To establish a reference collection of benthic invertebrates for future taxonomic comparisons.

The survey will be performed through standard quantitative benthic biology techniques on board R/V HERO. A sampling grid has been designed to observe the impact of oil both from the source of the spill and the areas where it was finally deposited. Faunal numerical, gravimetric and taxonomic analysis will be followed by statistical-mathematical treatment of the data to determine several of the important bio-indices useful in the understanding of possible alterations of the biota by the spilled oil.

The sampling is expected to take place in the coming southern autumn from R/V HERO by a binational team of US and Chilean scientists.

R804515 01

Irrigation return flows may contain limiting concentrations of salinity, fertilizers, pesticide residues, and sediments. Understanding the complex processes involved with a view towards their management requires the use of detailed return flow simulation models. This project is proposed to identify the existing irrigation return flow models and develop a description of their data inputs, time and storage requirements, previous applications, simplifying assumptions, and output. The results will allow effective use of the presently available technology and thereby minimize unnecessary duplication. In addition, the project will delineate areas where added emphasis should be given in order to develop more efficient models.

R804517 01

The objective of the proposed research is to enlarge upon the results of previous research on larval fish distributions and mortality in the vicinity of a steam-electric station with once-through cooling on western Lake Erie. Past research demonstrates that large numbers of larval fish are entrained and could be killed and that larval fish species may not all be equally susceptible to entrainment because of distributional peculiarities. However, past research has been conducted primarily during the day, and preliminary night-sampling has indicated that daytime sampling of fish distributions and mortality in the cooling system may bias results of analyses substantially. Most larvae remain near the bottom during the day.

The purpose of the proposed study is to investigate nighttime distributions of larvae throughout the water column using oblique top to bottom tows of 1 m 363u plankton nets. Other sampling will be conducted during the day using a bottom sled to compare larval fish abundances on the bottom in water offshore (5 m or more deep), with abundances close to shore along beaches and marshy embayments (about 1 m deep). Nighttime mortality will be studied in the cooling system of the Monroe Power Plant to compare estimates made during the day. Sampling is planned for spring 1976 and 1977 (April, May and June) at times when all of the important larval fish species are present in this part of Lake Erie.

R804519 01

Food concentrations, food types and stocking densities have important effects on growth and survival of marine fish larvae reared under laboratory conditions. Present EPA supported research is designed to determine optimum conditions of stock and food that will insure production of physiologically healthy larvae that could be used in pollution and toxicant bioassays. Spotted seatrout and lined soles are common Biscayne Bay fishes that spawn over a long season, thus making them ideal subjects for this research. This proposal seeks to broaden the area of research on the two species to include investigations of feeding rates, feeding dynamics and first order growth efficiency. These studies will be carried out using copepod nauplii, rotifers, and brine shrimp nauplii as food and they will be run at a series of temperatures that encompass the normal spawning range of the species. Effects of food concentration on feeding rates and growth efficiency also will be determined. Feeding dynamics will be examined by investigating factors such as feeding efficiency, the interval between feeding attempts and the volume of water searched per unit time. These factors will be studied in relation to food type, food concentration and temperature. Results of this research will be important to develop general rearing methods for marine fish larvae and will add to our knowledge of the specific requirements of several species that are now being investigated in Biscayne Bay, Florida.

R804521 01

Objectives - To devise feasible and economic methodology for removing existing organic contaminants from ground water and/or prevent development of potential carcinogens in the public water supplies in Dade County, Florida.

Approach - Various types of activated carbons as well as macro-reticulated resins will be evaluated to see which of these is the most efficient and most economical to use in removing organic contaminants from drinking water.

Current Progress - The Drinking Water Quality Laboratory, School of Technology, Florida International University, Miami, Florida has been using the Tracor 222 gas chromatograph to study chloroform content in waters from the Preston Water Treatment Plant in Dade County, Florida. The results of these studies are in Report #1, "Variations in the Chloroform Content of Waters from the John E. Preston Water Treatment Plant, Hialeah, Florida." Report #1 is from the Drinking Water Quality Laboratory at Florida International University, Miami, Florida.

R804522-01

The primary objective of this project is to assess the larval fish populations in the Michigan waters of Lake Erie. Seasonal variation, nearshore-offshore relationships, and nursery grounds will be identified. These data will be employed to relate larval fish populations to pollution or water use impacts.

Eighteen sampling stations will be located on five transects along the Michigan shoreline of Lake Erie. Surface and bottom tows will be made at each station with a 571 micron mesh, 1 meter diameter plankton net. Twelve sampling runs will be conducted at two-week intervals from April to September. In addition, three beach zones will be sampled with a modified seine.

The data collection will be coordinated with other concurrent EPA sponsored larval fish studies in the western basin of Lake Erie. The total project will establish a data base for a model which will estimate the effects of continuous or additional larval fish mortality on existing and future fish populations.

All results will be summarized and presented in an EPA Pollution Control Research Series report.

R804527 01

The purpose of this project is to study chemically induced tumors in teleost fishes. Both marine and freshwater species will be exposed to low levels of a known carcinogen for 300 days. Fish developing tumors or other pathologies during this period will be sacrificed and tissue from the liver, kidney, intestine, and gills will be studied histologically. Tissues from all the fish with no grossly apparent pathologies at the time the experiment is terminated will be studied in the same manner in order to detect any neoplasias or preneoplastic conditions.

It is expected that this research will:

- 1) provide evidence concerning the quantities of benzopyrene necessary to induce neoplasias.
- 2) supply additional data concerning tumors in teleosts.
- 3) establish the feasibility of using teleost fish as early indicators of carcinogenic substances in the aquatic environment, and
- 4) demonstrate that this type system could be used to screen compounds for carcinogenic properties with less difficulty and expense than the methods currently employed.

R804529 01

Recognizing the Environmental Protection Agency's need for field-level information on processes, costs, problems, and impacts of sludge disposal, the Association of Metropolitan Sewage Agencies will review existing information from its member organizations on various issues related to sludge management. Information and data for the following categories will be assembled:

1. descriptive data on present and future facilities;
2. sludge generation and disposal data;
3. cost information, both in terms of money and energy;
4. public health and safety information;
5. the results of past research efforts;
6. progress on current research efforts;
7. alternative management programs now under consideration; and
8. institutional and political considerations relevant to sludge management.

R804531 01

The objective is to develop more economically feasible methods than those currently available for continuous treatment of flue gas cleaning (FGC) wastes. Initial efforts are to be concentrated on applying gravity sedimentation to rapidly, inexpensively dewater FGC wastes. The approach will be to: Develop methods for characterizing the physical properties and behavior of FGC wastes. Develop procedures based on the models presented herein to allow accurate design and analysis of gravity sedimentation units used in treating FGC wastes. Perform bench scale and pilot tests to evaluate the feasibility of using gravity sedimentation units for treating FGC wastes. Perform developmental studies to determine the best design for channel promoters. Bench scale and continuous pilot tests are to be performed to evaluate the feasibility of such devices for improving dewatering efficiency while treating FGC wastes. Assess filter ability of different types of FGC sludges dewatered to different degrees and pumping requirements for the different sludges.

R804536 01

Stations will be installed to measure water discharge and to take volume-integrated samples as well as discrete samples during storm events. These samples will be analyzed for concentrations of pesticides, particulates, mineral nutrients, heavy metals, organic matter, bacteria, and various pathogens as well as pathogen indicators. Installation will be built on three field sized and various parts of a basin sized watershed. Rainfall amounts and intensities, soil moisture and temperature, wind speed and direction, sunlight intensity, and evaporation rate data will also be collected. This data will be used by the E.P.A. watershed modeling group at Athens, Ga. to test and to develop models for pollution due to run-off from fields and watershed basins in agricultural areas. The principal land use categories to be studied are row-crop (especially corn), pastures, forest, and freshwater wetlands. Research on the kinetics of herbicide breakdown in soils and the products of degradation will be initiated.

R804538 01

The purpose of this project is to develop a technical rationale for the ultimate establishment of criteria for industrial pretreatment requirements for metals discharged into combined industrial-municipal treatment systems (CTS's). The extent to which metals are in part removed in, and in part pass through CTS's has been shown to be influenced by influent metals present and their concentrations other industrial and domestic waste characteristics and type and mode of operation of unit treatment processes involved. Work to date indicates that extent of metal pass-through CTS's is related to complexing/chelating mechanisms associated with both the liquid and sludge phases of the raw and treated wastewater. This project, through pilot and full-scale studies, will identify and evaluate the significance of variables which affect the extent of removal of the nine metals aluminum, cadmium, chromium, copper, iron, lead, mercury, nickel and zinc in CTS's.

In brief then, this project is directed toward clarifying the relationships between the chemistry of the wastewater and the extent of metals removal in combined treatment systems. Progress here will permit the proper interpretation of existing plant data and identify technical rationale and relevant supporting data for development of industrial pretreatment requirements.

R804539 01

The aim of our work is to do research on human exposure to pesticides from several points of view. One is the assessment of biochemical and clinical effects of cholinesterase inhibitors. The activity of blood cholinesterases will be measured in occupationally exposed people and correlated with the degree of exposure and with signs and symptoms of poisoning. Measurements of the vitamin A content in the serum of workers will be performed and at the same time these workers will be subjected to ophthalmological examinations. It will be evaluated further whether pesticides influence the behaviour of exposed workers, the intention being to find methods which could be used to establish whether pesticides diminish functional capabilities of exposed subjects. Analytical methods will be introduced for determining pesticide residues in human blood and/or urine, and applied to occupationally exposed subjects and the general population.

The mechanism of action of OP compounds on molecular level will be studied in cholinesterases. Their reaction with OP compounds and carboxylic acid esters will be studied with particular emphasis on substrate inhibition and reversible binding of OP compounds to cholinesterases. The mechanism of these reactions is controversial, and it is also not known whether enzyme inhibition by the substrate itself has any physiological significance.

R804541 01

This investigation will examine the toxic, sublethal and latent effects of certain polycyclic aromatic hydrocarbons and barium sulfate on larval and adult stages of selected invertebrates and fish. Experiments are designed to determine the effects of these compounds on (a) crustacean molt cycles, (b) regenerative limb growth, (c) respiration, (d) heart rate and (e) histology and ultrastructure of selected tissues. Studies are aimed to determine the uptake by marine organisms of these pollutants from water and bioaccumulation through aquatic food chains. By using a combination of autoradiographic and conventional analytical techniques the sites and extent of accumulation of pollutants in marine organisms will be determined.

S804544 01

Objectives of this project would be to communicate details and benefits of IRIS system to as many municipal solid waste collection and disposal officials as possible and to encourage installation of IRIS in 70 to 100 cities throughout the U.S.

R804546 01

A systematic, detailed, and quantitative characterization of primary and secondary trace pollutants, with emphasis on the halocarbons, as a function of time (both diurnally and seasonally) and location (including urban, suburban, and wilderness sites) will be conducted using in-situ, long-path, high resolution Fourier transform infrared spectroscopy in conjunction with a wide range of conventional and state-of-the-art gas phase and particulate analytical methods.

This program, which is an extension of a prototype long-path infrared study conducted by the EPA in 1972-73, will examine ambient air at Pasadena and Riverside, California, and at a (presumably) unpolluted, high altitude site in Colorado (Mt. Evans), using the part-per-billion sensitivity afforded by an open, 3-kilometer path-length, multiple reflection cell and an FTS-20 Fourier transform infrared spectrometer (both of which are the property of the EPA and will be on loan to SAPRC for this three year project). Portable instrumentation currently employed in gas phase and particulate ambient air monitoring studies at SAPRC will be operated in conjunction with the proposed long-path infrared studies during selected periods at all three locations. This program will be coordinated with, and will complement, ongoing ambient air monitoring studies at SAPRC which are supported by the National Science Foundation-RANN and the California Air Resources Board.

Emphasis in this program will be placed on the detection and quantitative determination, at the part-per-billion concentration level in ambient air, of a substantial number of products, labile intermediates, and primary pollutants for which little, if any, reliable ambient air data are currently available. These compounds include, but are not limited to, halocarbons, halogenated acids, nitrous acid, nitric acid, hydrogen peroxide, nitrosamines, alcohols, epoxides, and organic acids, aldehydes, and other carbonyl compounds.

R804548 01

The objective will be to prepare a manual on cost/effective management systems to control pollution from non-NPDES livestock production facilities, excluding animals on range. Livestock species to be considered are fed beef, cows/calves, dairy cattle, dry cows/heifers, fed hogs, hog breeding, sheep, and poultry.

This objective will be accomplished through a review of existing literature, consulting with leading scientists and extension personnel, regional reports by consultants and a two day workshop to formalize manual. The project will be concluded with a written manual.

The primary objective of this project is to develop an analytical procedure that can be used to predict whether chemical contaminants present in municipal and industrial landfills or waste lagoons will migrate through the soil and subsoil systems into the groundwater of the area and thereby cause the groundwater to become polluted. The initial phase of this study will be devoted to a laboratory study in which compounds of known composition will be added to various types of soil and subsoil materials in order to determine the effect of the organic compounds on the properties of the soil particles with particular emphasis on the porosity of the soil system. The physical and chemical characteristics of the soil particles will be determined. During the latter phase of this study actual wastewaters derived from existing landfill operations will be utilized to determine how well the model compounds used predict behavior of actual waste components in waters which contain these same compounds. Ultimately, this project will involve field studies in which groundwater samples will be taken near land disposal sites in order to see how well the developed analytical procedure predicts actual movement in soil and subsurface strata.

It is anticipated that the study will focus on the development of a column penetration test in which various known compounds in well defined solvents, as well as complex mixtures of industrial wastes, will be added to the column and the rate and extent of migration of the compounds, which could adversely affect groundwater quality, will be determined.

The objectives of this project are the structuring and implementing of a two-layered multi-dimensional estuarine water quality model for the purpose of evaluating the effects of phenomena such as two-layered estuarine circulation, the salt-fresh water interfacial region, nutrient entrapment, and the fate of hazardous substances.

The approach to be used is to first establish a proper model circulation pattern using such suitable tracers as chlorides, conductivity, and dissolved or suspended solids. This verified transport regime will then be incorporated into a phytoplankton modelling framework which will include some species differentiation. Finally, a modelling methodology for estimating the fate of hazardous substances will be developed.

Initial applications of the model will be to Gulf and East Coast estuaries.

The benefit expected to be derived from the research is the increased ability to assess the effects which various control alternatives for location, type and level of waste treatment facilities have on the saline region and transitional zone of estuarine systems, including quantifying the effect on phytoplankton populations. Significant results are also anticipated from the modelling of hazardous substances which, of course, have implications throughout the food chain, including the potential effects on man.

R804565 01

The ultimate goal of the proposed research is to develop an economic process for iron removal from acidic waste process liquors by hydrolysis to the hematite form while regenerating acid values, such that the acidic liquor can be recycled to the original process and the hematite crystals sold as a useful product. The specific objectives of the first budget period are to demonstrate the process with plant copper leach liquors and obtain crystal growth and nucleation data to complete a process design model. Later phases of the project period will involve an industrial partner in the operation of a pilot-sized demonstration unit. The experimental approach used in the current budget period will involve continuous and semicontinuous hydrolysis runs in a two-gallon pressure reactor/crystallizer. Hematite crystal growth and nucleation rates will be measured by accurate particle-size measurement in the $\leq 50\mu\text{m}$ size range using an electronic particle counter. The two-gallon pressure reactor was previously assembled and operated with reagent feeds to test the idea of retained-bed crystallizer operation for this hydrolysis reaction. Such retained-bed operation significantly increased iron yield and/or lowered the severity of operating conditions.

R804568 01

The overall objective of this project is to determine the feasibility of treating various waste streams generated in the non-ferrous metal industries by the application of sulfide precipitation with sodium sulfide and of charged membrane ultrafiltration with commercially-available, negatively-charged, acid-resistant, non-cellulosic membranes. An extensive bench-scale experimental investigation will be conducted with synthetic systems containing the proper metal salts as well as with specific actual waste streams.

The sulfide precipitation process will primarily be studied for the removal of Hg and As and to further reduce the concentration of Zn, Cu, Pb, and Cd. The optimum pH range and sulfide dosage will be established. Charged membrane ultrafiltration will be evaluated in terms of obtaining high water recovery and adequate solute rejections of the prominent constituents including selenium. The effects of pH, inlet velocity, waste concentrations, and pressure (3 to 5 atmospheres) will be established. Computer simulation will be used to scale up laboratory data, and the economics will be evaluated and compared with sulfide precipitation and with combined lime-sulfide precipitation processes.

The use of charged membrane ultrafiltration and/or sulfide precipitation should be beneficial to meet BATEA standards and/or make the effluent suitable for direct reuse as process water.

R804573 01

The ability of the herbivorous zooplankton to regulate algal productivity in highly eutrophic Saginaw Bay (Lake Huron) and Western Lake Erie will be determined. Total grazing, as well as size-selective feeding on small flagellates as well as large diatoms and blue-green algae will be measured in the field. This information on important carbon fluxes is vital to the modeling team responsible for the ultimate synthesis of data on Great Lakes ecosystems. Field studies of grazing will depend on ^{14}C tagging techniques. In the laboratory the feeding habits of rotifers, often ignored, will be investigated using new particle counting techniques combined with computer analysis. All of these investigations will be based on progress made by an experimental team during the Upper Lakes Reference Study. Results already show that the crustaceans control algal production in open lake only during the fall months. Biological control of the growth of blue-green algae failed to develop in mid-summer. Discovery of the degree of biological control in the most eutrophic areas of the Great Lakes is vital to understanding the functioning of these ecosystems, ultimately producing validated simulation models for them, and finally managing algal bloom problems.

R804578 01

Of all municipal-related pollution abatement problems, the most significant in terms of cost and technical complexity is storm and combined sewerage system overflow loadings. According to recent estimates, the costs of implementing measures to control storm water runoff and combined sewer overflows are approximately \$261 billion.

Application of management concepts to sewer systems can enhance the usefulness of existing combined sewerage systems, particularly during wet weather conditions, and thus reduce the level of required expensive structural controls. One aspect of sewer system management is a vigorous troubleshooting and maintenance program utilizing conventional means to cleanse troublesome deposition locations.

The concept of depositing-solids control in sewer lines, although widely used around the turn of the century as a maintenance practice, is still only occasionally viewed as a viable pollution control alternative for combined sewer systems. Much theoretical but little applied research has been performed to develop an understanding of the mechanisms of solids deposition. Even less work has been performed to develop and quantify uniform criteria for flushing sewers.

R804586 01

A literature review is presented concerning the feasibility of employing bacteria as screening agents in the detection of environmental carcinogens. This test is based on the finding that some carcinogens are mutagenic in bacteria.

R804588

"Rehabilitation Effects in Long Lake, Washington" - The purpose of this grant is to study the status of the phytoplankton and rooted macrophyte communities, the nutrient levels in water and sediment and their interchange, and the nutrient budgets during the one year before and one to two years following rehabilitative measures in Long Lake, Kitsap County Washington.

R804593 01

The 2nd International Conference of the International Solid Wastes and Public Cleansing Association ISWA will be held in Padua, Italy, June 21-25, 1976. The Conference will bring together engineers, scientists, manufacturers of process and control equipment, and administrators in solid waste management in order that recent advances in sciences and technology of solid waste management can be discussed and their application considered.

The technical programs will feature sessions on: 1. Recycling and Re-use of Wastes; 2. Technical development and progress in regard to sanitary landfills; 3. The environment and waste treatment by incineration and pyrolysis; 4. Development in the treatment of sludges; 5. Newly developed methods of waste collection, transportation and street cleaning; 6. Treatment of hazardous wastes, including legal aspects. The objectives of the Conference are to provide a forerun for presentation of research on solid waste management.

R 804 595

Laboratory Research is proposed in three specific areas:

1. Test and Evaluate Anaconda's Arbiter Hydrometallurgy Process for the Recovery of Fixation of Arsenic from Flue Dust Waste". Retention of Arsenic in the aqueous state during the removal of other base metals. Purification of final arsenic solution to recover or contain arsenic in a stable form. Pilot plant operation on final test circuit.
2. "Test and Evaluate Calcium Fixation Arsenic by Roasting with Lime for Controlling Flue Dust Waste." Test all variables that go into a successful toast. Test final calcium arsenate for stability under varied weathering conditions. Make High Gradient Magnetic Separation tests on various test products from any of the research programs.
3. "Test and Evaluate Arsenic Absorption by Clays as an Alternate Fixation and Recovery Technique for Controlling Flue Dust Waste". Test variables for replacement of the alumina or phosphate radical by arsenic-for arsenic retention.

This research investigation will be performed at the Anaconda Research Center. Tucson, Arizona, the Montana College of Mineral Science and Technology Campus, and the Mineral Research Center, Butte, Montana.

R804598 01

Objectives - to assess the feasibility of studies to determine the health impact of the new water filtration plant in Duluth, Minnesota, which is designed to filter approximately 90 percent of asbestiform fibers from Duluth water and is expected to be in operation in early 1977. Since June, 1973, when it was announced that Lake Superior and the Duluth municipal water supply, which is drawn from the lake, contained large numbers of asbestiform fibers, many environmental and human health studies have been performed to better assess the situation and its potential hazards. With the new water filtration plant apparently being the primary measure to remove asbestiform fibers already in the source of Duluth's municipal water supply, it is important to determine ways of measuring the impact of this control measure.

Approach - Its main component would be review and analysis of all previous and current water and human health studies related to the presence of asbestiform fibers in Duluth's municipal water supply. This would involve review of pertinent scientific literature, communication with appropriate technical experts in environmental health, epidemiology, and medicine, and possibly the development and frequent meeting of a multi-disciplinary technical advisory group.

Current Plans and/or Progress - It is anticipated that the project will commence on July 1, 1976 and be completed by June 30, 1977.

R804608 01

Project objectives are, broadly, the further assessment of animal waste land application and animal production sites along with techniques for controlling possible non point source contributions from such sites. Specifically investigations will be made of 1) the fourth and fifth years of a plant-soil system receiving swine lagoon effluent in which crop, soil, and rainfall runoff responses are measured, 2) evaluation of the rainfall runoff loads from a swine drylot and subsequent stream sub-environmental impact, 3) detailed evaluation to estimate the relative subsurface lateral and vertical deep movement of constituents in a sandy top soil - clay undersoil system, and 4) evaluation of the effect of grass buffer strips of varying lengths in reducing the impacts of rainfall runoff from land application sites. The experimental approach involves plot and farm scale units in which data are meaningful in animal production facilities. The information and mechanistic implications are to be utilized by the researchers, others in the modelling field, and regulatory agencies as a part of the understanding of non-point sources of pollution.

R804612 01

The Ohio State University, Center for Lake Erie Area Research (CLEAR) proposes to conduct studies of (1) water quality, particularly nutrients/oxygen relationships, in the western and central basins of Lake Erie and (2) fish larvae in the western basin and Sandusky Bay. A comprehensive study of the status of eutrophication in Lake Erie is now being completed by CLEAR in support of an assessment of the effectiveness of nutrient control programs (EPA Grant No. R-802543). A subproject of this grant deals with populations estimates of fish larvae in western Lake Erie. Data generated by these studies also form the base of deterministic models now under development by EPA, Large Lakes Research Station, Grosse Ile, Michigan.

R804616 01

With the anticipated increases in coal consumption in the next decade greater demands will be made on existing transportation systems to move to market the abundant reserves of coal in the U.S. Conventional transportation modes such as rail and barge will have to expand their capabilities by overcoming whatever shortages may exist in manpower, capital, and hardware. Simultaneously, lesser known systems such as coal in water (slurry) pipelines will have to share the transportation load. With some halfdozen coal slurry pipelines being considered for construction within the next five years, pending eminent domain legislation, it will be a matter of time before these lines are built.

A coal slurry pipeline system may impact the environment at three stages: design, construction, operation and maintenance; and in three areas: slurry preparation, slurry pipeline, and slurry separation.

It is proposed to study the environmental and pollution aspects of coal slurry pipelines. This work would enhance the selection of better design, construction, and operation techniques to provide a balance of engineering economics, and environmental considerations.

R804618 01

The objectives of this grant are to: 1) conduct a symposium to assess the state-of-the-art of viral pathogen hazards from the application of sewage effluent, digested sludge or solid municipal waste to plant-soil systems.; 2) publish the results of the symposium as soon as possible so that the research community will have guidance in working effectively to measure and manage hazards that may be inherent in viral pathogens present in municipal waste.

The symposium is designed for scientists who lack training or cognizance of the public health problems posed by viral pathogens associated with recycling effluent, digested sludge and solid waste in agricultural plant-soil systems.

R804629 01 0

The objective of this one-year grant proposal is to obtain kinetic information on the reactions of olefins and aromatics with OH radicals. Specifically, a detailed product analysis study of these reactions will be undertaken.

R804642 01

Objectives & Scope of Work

The objectives of this study are to identify the research, development and demonstration needs for prevention and control of air, land & water pollution from the food industry & to discuss methods of setting program priorities. In conducting this study, emphasis will be placed on ascertaining the environmental significance of the processes & specific unit operations employed in the food industries.

The scope of work as envisioned at this time includes 4 tasks: (1) Development of Industries Profiles - (Identify companies, products, & processes.) (2) Identification & Characterization of Emission Streams - (Quantify solid waste, water & air emissions by product & by unit processing operation.) (3) Discussion of Control Technology Needs - (Discuss adequacy of existing technology from both a technical & ~~economic~~ economic standpoint & identify RD&D needs.) (4) Discussion of Program Priorities - (Suggest criteria for setting priorities & quantify the analysis where possible to aid in setting priorities.)

The food industries to be included in this study will be: Intermediate Processing - vegetable oil processing, inedible fats & oils, sugar (cane, beet), flour milling, rice milling, malt production, corn milling, chocolate & cocoa products, flavoring extracts & flavoring syrups. Final Foods & Processing - livestock feed, pet food, meat packing & prepared meats, fresh & frozen seafood, canned & cured seafood, dairy products, wine industry, malt beverages, distilled liquor, soft drinks, canned food, cured & frozen food, baking, cereal breakfast foods, edible fats & oils, food preparations, macaroni & spaghetti, roasted coffee, and confections.

R804644 01

The objective of the project is to determine the sulfur trioxide levels in exhaust gas from kraft recovery furnaces. The approach is to measure sulfur trioxide levels using the method of condensation of SO_3 at its dew point in a sample which has been previously filtered to remove any sodium sulphate present. The findings should be beneficial in determining whether sulfur trioxide emissions from kraft recovery furnaces are of any significant consequence in air quality management programs.

R804646 01

The objective of the work is definition of the potential odor contribution of selected process streams and mixtures of process streams in the kraft operation which are routinely seweraged and to determine the relative effectiveness of air and stream stripping in reducing odor potential of these streams. The approach is to chemically and organoleptically analyze samples from representative mills both before and after the samples are air and stream stripped.

S 804648

Objective: In one step, to treat a waste water for reduction and removal of hexavalent chromium and for removal of zinc.

Approach: Control influent PH to a precipitator and proportion (based on flow) a feed of polyelectrolyte and iron sulfide slurry to this influent.

Progress: Laboratory data indicates chromium content of the filtered effluent from this process is 0.05 mg/l and zinc content is 0.01 mg/l. The ph was controlled at 8.5 ± 0.1 .

R804694 01

The objective of this proposal is to reduce refuse collection costs per ton in New York City, through the identification and use of more appropriate refuse collection vehicles.

There are five critical analytic elements necessary to match operational demands with equipment configurations: the identification of refuse generation and collection demand characteristics of different areas of the City; development of optimum truck performance specifications for different areas of the City based upon demand characteristics; a performance evaluation of current marketed trucks; efficiency ratings for different vehicles by area of the City; the construction of a vehicle replacement schedule and the evaluation of the actual performance of vehicles.

S 804775

This project is designed to assess the environmental impact of the baling method of disposal of solid waste. A previous project has established a baled landfill monitoring site near St. Paul, Minnesota, which has been monitored for only a short time. The present project proposes to monitor leachates and gases produced during the fourth and fifth years of lifetime of the baled landfill site.

Samples will be collected on a quarterly basis and will be analyzed for a wide variety of parameters, including organic, inorganic and biological contaminants. Measurement will also be made on volume of leachate, temperature of landfill and settlement of bales in the landfill.

Comparison of results with similar data collected for other types of landfills will help establish the desirability of baling as a means of solid waste disposal.

S 804 785

Charlottesville, Virginia Resource Recovery Implementation Grant - The purpose of this grant is to financially and technically assist the City of Charlottesville to implement a municipal solid waste resource recovery system.

S 804 786

The purpose of this grant is to financially and technically assist the State of Maryland to implement a municipal solid waste resource recovery system.

S 804 787

The purpose of this grant is to financially and technically assist the City of Detroit to implement a municipal resource recovery system.

S 804 800

The purpose of this grant is to financially and technically assist Stanislaus County to implement a system for the source separation of municipal solid waste.

S 804 819

1) Evaluation of overall cost-benefit impacts of charging solid waste costs at the point of production.

2) and 3) To be undertaken in three stages: (1) gathering the relevant materials and preparing a draft summary, (2) discussion and evaluation of the summary with well-informed representatives of the various potential user categories, and (3) preparation of a revised final report taking into account user comments and criticisms.

SECTION III

CROSS-WALK FOR FY 1976 PROGRAM ELEMENTS

<u>PROGRAM/SUB-PROGRAM AREAS</u>	<u>PROGRAM ELEMENT NUMBER</u>		
<u>HEALTH AND ECOLOGICAL EFFECTS</u>			
HEALTH EFFECTS	1AA601 1FA628	1BA607 1HA630	1EA615 1LA629
ECOLOGICAL PROCESSES AND EFFECTS	1AA602	1BA608	1HA616
TRANSPORT AND FATE OF POLLUTANTS	1AA603	1BA609	
<u>ENERGY</u>			
EXTRACTION AND PROCESSING TECHNOLOGY	EHE623		
CONSERVATION, UTILIZATION AND TECHNOLOGY ASSESSMENTS	EHE624	EHE626	
HEALTH AND ECOLOGICAL EFFECTS	EHE625		
<u>INDUSTRIAL PROCESSES</u>			
MINERALS, PROCESSING AND MANUFACTURING	1AB604 1BD613	1BB610 1HD620	1BD612
RENEWABLE RESOURCES	1DC058	1HB617	
<u>PUBLIC SECTOR ACTIVITIES</u>			
WASTE MANAGEMENT	1BC611	1DC618	1BC362
WATER SUPPLY	1CC614		
ENVIRONMENTAL MANAGEMENT	1DC310	1HC619	
<u>MONITORING AND TECHNICAL SUPPORT</u>			
MEASUREMENT TECHNIQUES AND EQUIPMENT DEVELOPMENT	1AD605	1AD606	
QUALITY ASSURANCE	1HD621		
TECHNICAL SUPPORT	1HD622		

MAJOR DIVISION OF PROGRAM ELEMENT NUMBER

1A Air	1B Water	1C Water Supply
1D Solid Waste	1E Pesticides	1F Radiation
1H Interdisciplinary	1L Toxic Substances	EH Energy Research and Development

APPENDIX A

REGIONAL OFFICES RESPONSIBLE FOR GRANTS ADMINISTRATION

<u>States & Territories</u>	<u>Address</u>	<u>Telephone No.</u>
<u>Region I</u>		
Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island & Vermont	Room 2203 John F. Kennedy Federal Bldg. Boston, Massachusetts 02203	FTS 223-5741 CML (617) 223-5741
<u>Region II</u>		
New Jersey, New York, Puerto Rico & Virgin Islands	Room 908 26 Federal Plaza New York, New York 10007	FTS 264-9860 CML (212) 264-9860
<u>Region III</u>		
Delaware, Maryland, Pennsylvania, Virginia, West Virginia & District of Columbia	6th and Walnut Streets Curtis Building Philadelphia, Pennsylvania 19106	FTS 597-0544 CML (215) 597-0544
<u>Region IV</u>		
Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee	345 Courtland Street, N.E. Atlanta, Georgia 30308	FTS 257-4793 CML (404) 881-4793
<u>Region V</u>		
Illinois, Indiana, Michigan, Minnesota, Ohio & Wisconsin	230 South Dearborn Street 12th Floor Chicago, Illinois 60604	FTS 353-2035 CML (312) 353-2035
<u>Region VI</u>		
Arkansas, Louisiana, New Mexico, Texas & Oklahoma	1201 Elm Street Dallas, Texas 75270	FTS 749-7231 CML (214) 749-7231
<u>Region VII</u>		
Iowa, Kansas, Missouri, & Nebraska	1735 Baltimore Street Rm. 29 Kansas City, Missouri 64108	FTS 758-5593 CML (816) 374-5593
<u>Region VIII</u>		
Colorado, Montana, North Dakota, South Dakota, Utah & Wyoming	Suite 900, Lincoln Tower 1860 Lincoln Street Denver, Colorado 80203	FTS 327-3962 CML (303) 837-3961
<u>Region IX</u>		
Arizona, California, Hawaii, Nevada, American Samoa, Guam, Trust Territories of Pacific Islands & Wake Island	100 California Street San Francisco, California 94111	FTS 556-5105 CML (415) 556-5105
<u>Region X</u>		
Alaska, Idaho, Oregon & Washington	1200 Sixth Avenue Seattle, Washington 98101	FTS 399-1096 CML (206) 442-1096